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FACTORY

MANAGEMENT AND MAINTENANCE

in September 1953:

p. 84 How to Write Better Letters to Employees

p. 96 The "Perfect Training Plan" for Maintenance Apprentices

p. 118 What You Need to Know About Electronic Controls

p. 134 How Good Are Predetermined Time Standards?

Plus 18 other articles and 15 regular departments

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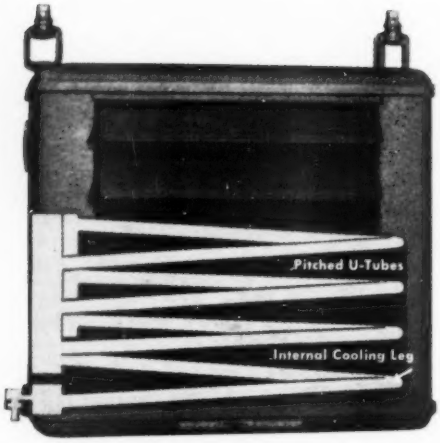
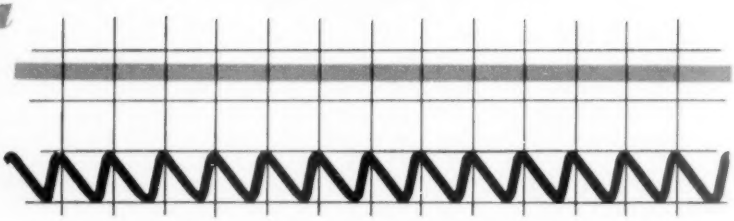


when buying unit heaters

be sure you get this

...not this!



With **THERMOLIER**...
the Grinnell Unit Heater . . . you get
CONTINUOUS RATED CAPACITY

THERMOLIER FEATURES

INTERNAL COOLING LEG A Grinnell feature which permits the use of a plain thermostatic trap for draining condensate.

PITCHED U-TUBES Built-in pitch of U-tubes provides complete drainage of condensate and elimination of destructive water hammer.

CONTINUOUS RATED CAPACITY The combination of Thermolier's internal cooling leg and the built-in pitch of tubes assures continuous rated capacity.

BUILT-IN EXPANSION PROVISIONS Every tube is an expansion bend of the U type to allow for independent expansion and contraction of each tube.

TUBE-TO-HEADER CONSTRUCTION Safety and durability assured by unique tube-to-header construction.

EASE OF ERECTION Exclusive with Thermolier are the adjustable swivel couplings which provide an easy, cost-saving method of hanging the unit.

SIMPLE PIPE CONNECTIONS The supply and return piping connections are on the same side to assure compactness, neatness and economy in installation.

MOTORS Thermolier motors are built specifically for unit heater duty. They give maximum operating efficiency with minimum power cost.

The practical advantages of unit heating, of course, are well known. But in order to get *maximum* economy and efficiency, certain engineering and structural features *must be* present in the unit heater of your choice.

Take provisions for draining off condensate. Failure to provide freedom from collected condensate in the heating element can interfere with heat output and adversely affect capacity.

A Thermolier Unit Heater successfully handles this drainage problem with its pitched U-tubes and internal cooling leg, through which all the condensate passes. In fact, condensate cooling is so efficient with Grinnell Thermoliers that a thermostatic trap — the simplest and least expensive of all traps — can be used with every model. Condensate temperature is lowered to the point where the trap is always draining — giving Thermolier Unit Heaters their *continuous rated capacity*.

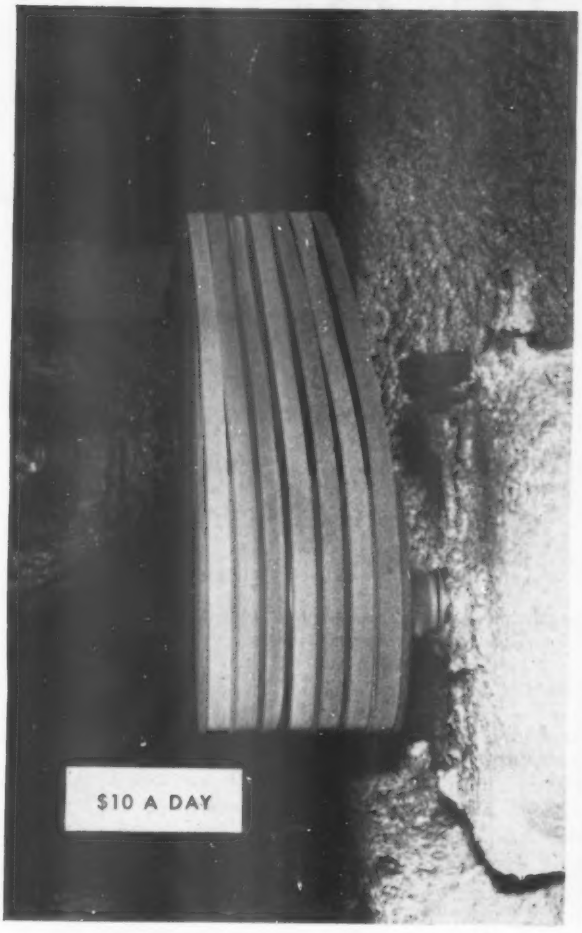
Check Thermolier's advantages at left. For more details, call your local Grinnell distributor — or send for catalog.

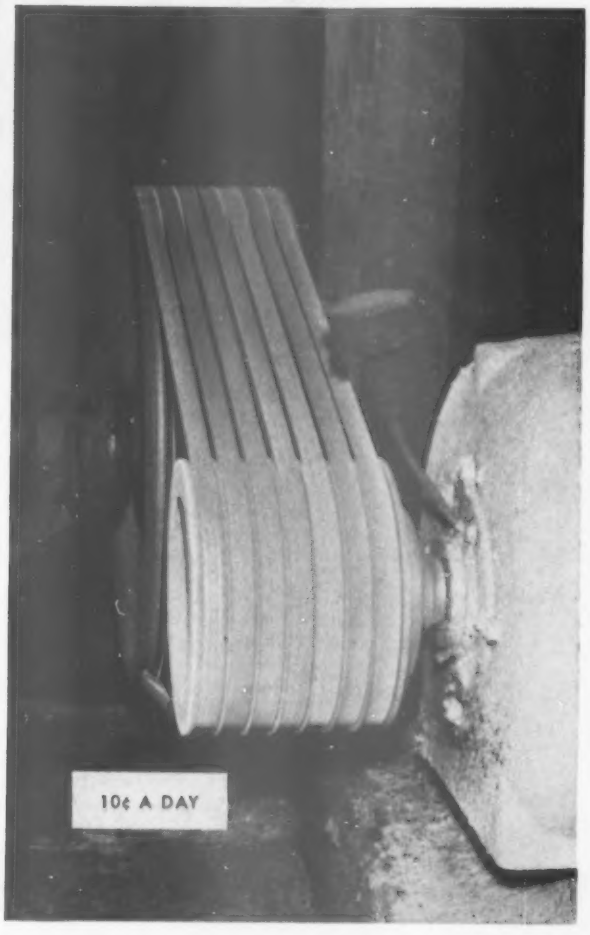
GRINNELL
THERMOLIER UNIT HEATERS

Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

Manufacturer of: pipe fittings • welding fittings • forged steel flanges • steel nipples • engineered pipe hangers and supports
Thermolier unit heaters • Grinnell-Saunders diaphragm valves • prefabricated piping • Grinnell automatic fire protection systems

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER





How these B. F. Goodrich belts cut costs from $10 a day to 10¢

A typical example of B. F. Goodrich improvement in rubber

THOSE pictures are of identical drives in the same plant. At left are ordinary V belts. Tension made them stretch out of shape so fast that $75 of belts only lasted 7 days—over $10 a day.

Then B. F. Goodrich grommet belts were tried. They lasted not 7 days but more than two years! B. F. Goodrich had tumbled belt costs from $10 a day to 10¢!

A grommet is a cord loop inside the belt. It is made like a giant twisted cable except that it's endless—no splices or overlaps. Grommet belts are more flexible, don't slip or stretch as much as ordinary belts. No other kind of belt has grommets; no other belt stands so much punishment or lasts so long.

Outlasting other rubber by many times is nothing unusual for products improved by B. F. Goodrich research. The cord conveyor belt which can last 10 times longer is typical of this. And the Burstproof steam hose that protects workers from scalding and injury makes a saving in safety as well as money. To find out more about these money-saving improvements and what they can do for you, send the coupon now for free facts on those rubber products you use.

The B. F. Goodrich Company
Dept. M-89, Akron 18, Ohio
I want to know more about the products I've checked below:
☐ Grommet V belts ☐ Cord conveyor belt
☐ Burstproof steam hose
☐ Other rubber products (name types)_____
☐ Send information by mail.
☐ Have a BFG distributor see me.
Name_____
Company_____
Address_____

Grommet V-Belts BY
B.F. Goodrich

FACTORY
MANAGEMENT AND MAINTENANCE

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OF PLANT MANAGEMENT
FOR 62 YEARS

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COMING IN OCTOBER

"THE SAD CASE OF COMPANY X" — which took the trouble to get a true picture of how its personnel policies were working out in practice. What Company X found was that its top-notch program was being unwittingly sabotaged by first-line supervision. Naturally couldn't happen to you. But a careful audit of even the best personnel program might disclose a few weaknesses — which could be readily corrected.

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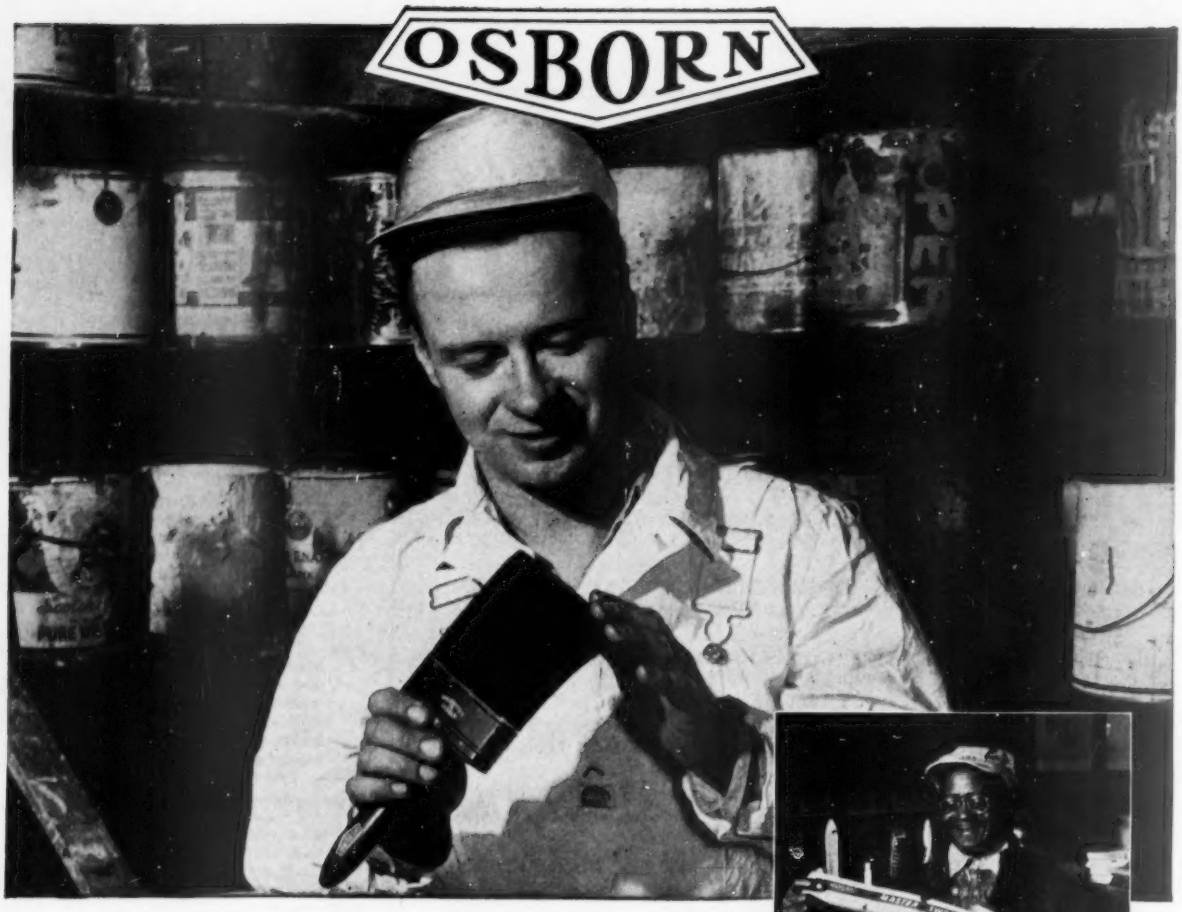

HANDY CATALOG. Simplifies specifying of Osborn maintenance and paint brushes. Write for your free copy today.

He can show you how to save time and money

THE man who uses brushes in his daily work knows the best when he sees it . . . he just looks for the name "OSBORN". His quick "OK" can be your clue to important savings in purchasing time and cost. All you need to do is put the name "OSBORN" on your order cards. Then buying is *quick* and *sure*. No need for shopping around. No risk of sacrificing quality.

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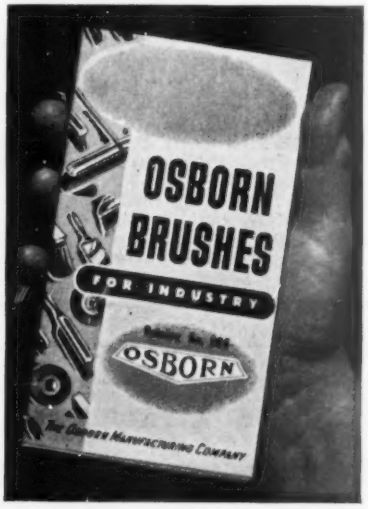
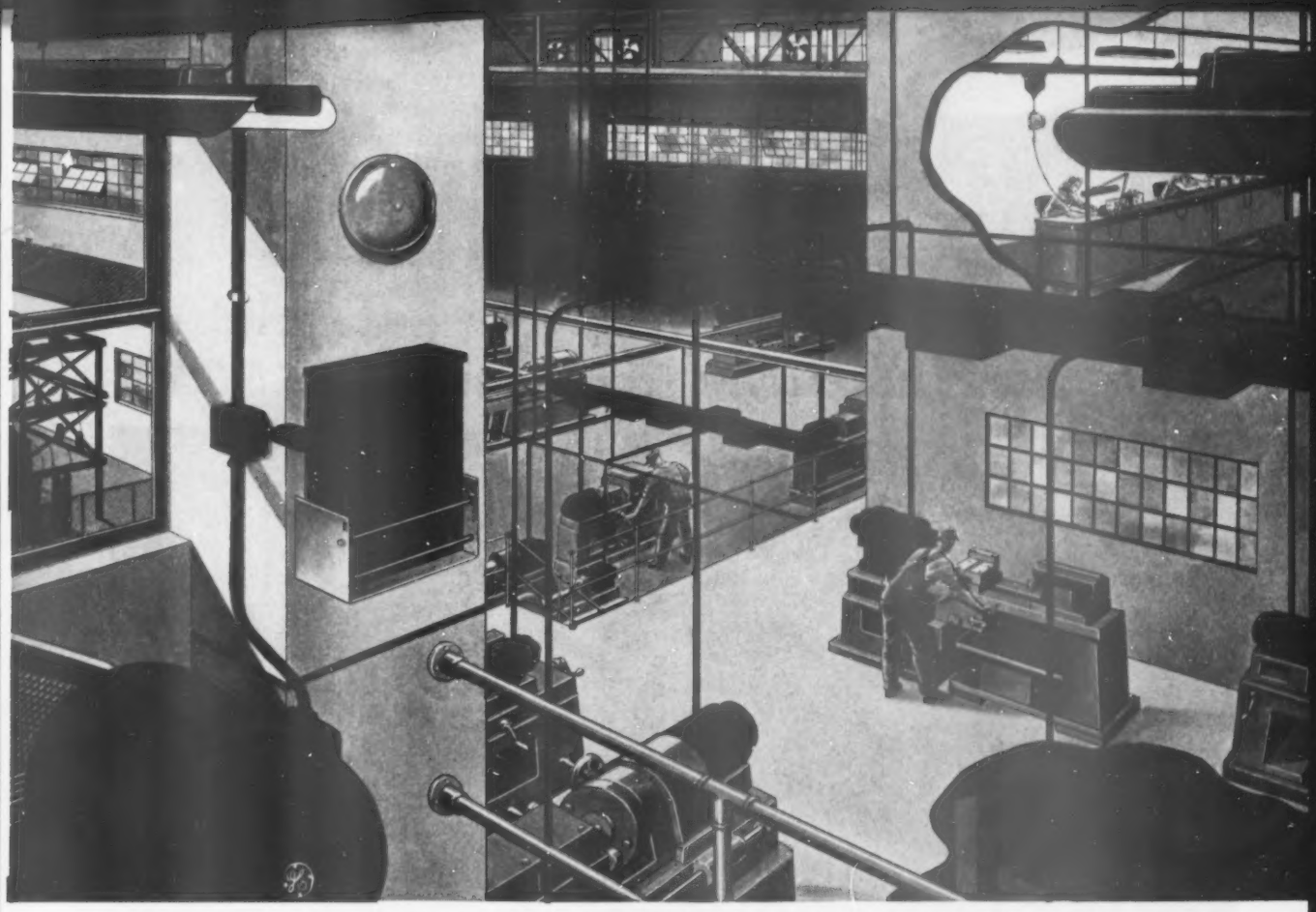


Osborn Brushes

OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES



RADIAL LOAD CENTERS, TRANSFORMERS, CAPACITORS, AND BUS DUCT SYSTEMS contribute heavily toward lowered production costs. Your near-by Graybar Representative will work with you or your electrical contractor in planning a completely efficient power distribution system for your plant.

How modern power distribution systems cut costs

ELECTRICAL CAPACITY DOUBLED without new transformers or wiring when this manufacturer installed G-E capacitors — savings in power costs paid for installation in 3 years. G-E capacitors and other popular G-E power distribution items are distributed nationally by Graybar.

Here are figures hard to ignore in today's drive toward lower production costs:

- **up to 34% more capacity from existing systems**
- **up to 18.5% less shutdown time**
- **up to 50% savings on power costs**
- **up to 150% annual return on your investment**

Powerful statements, to be sure, but still *facts* that can be backed up with actual case-history proof by your local Graybar Representative.

If you face the problem of designing a new power distribution system – or of forestalling major rewiring through increased efficiency of an existing system – then, *now* is the time to call Graybar.

It's just as costly to plan for, install and service inferior, misfit equipment as it is to do the same with quality items custom-fitted to your particular needs. Graybar Power Specialists have proved it for customers the nation over – let them prove it to *you*.

As distributor of over 100,000 different electrical items made by 200 leading manufacturers, you can always be sure of carefully-considered, impartial recommendations. It's the common-sense result of ordering everything electrical via *a single source . . . a single* responsibility. *Graybar Electric Co., Inc. Executive Offices: Graybar Building, 420 Lexington Avenue, New York 17, N. Y.*

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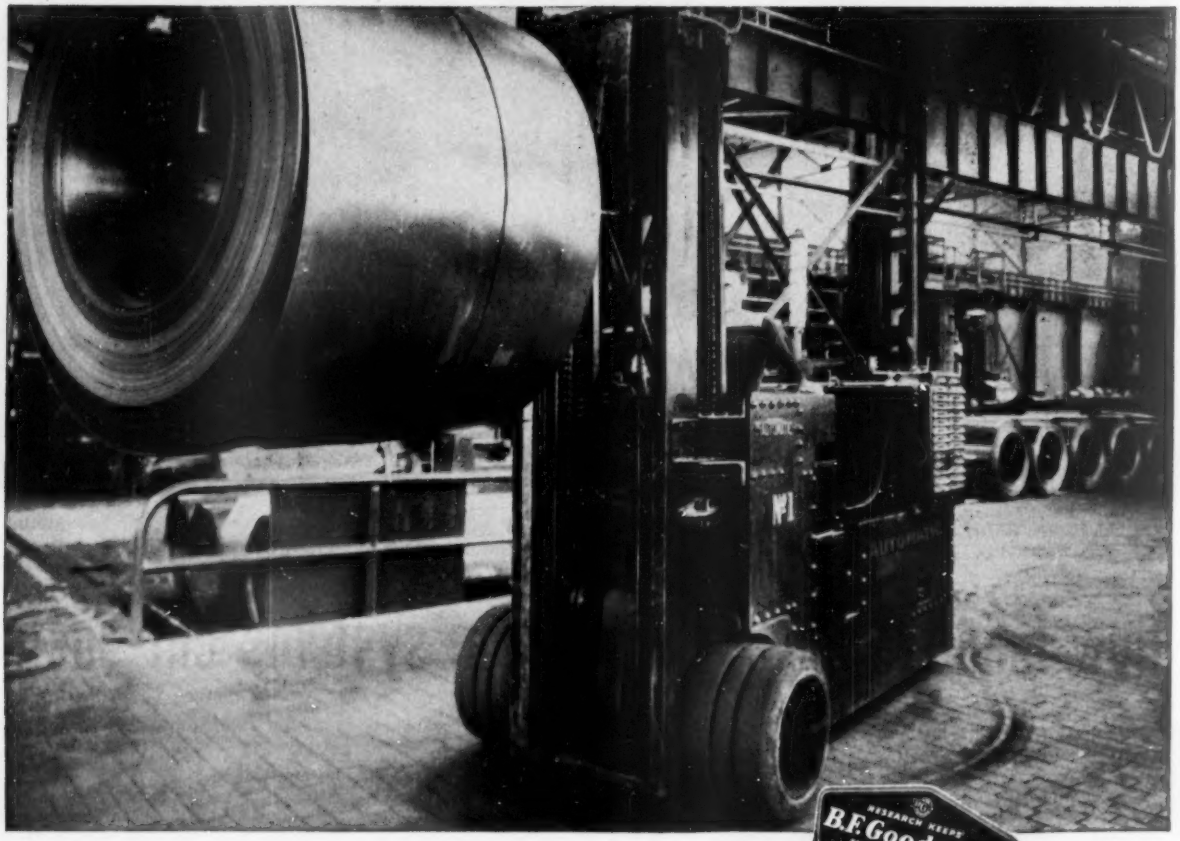
Call Graybar first for...

GRAYBAR *Everything Electrical*

IN OVER 100 PRINCIPAL CITIES

B.F.Goodrich

TW ANALYSIS solves your industrial tire problems, saves you as much as 50%



WHAT'S your industrial tire problem? Too much power-consumption or rolling resistance? Not enough traction? Cushioning or flotation? Or is it cutting, tread chipping or oil damage? No matter what it is, there's an industrial tire designed to solve it, one that may give you up to *twice as much service* as any other tire.

To help you specify this tire, B. F. Goodrich has developed the Tire and Wheel Analysis Plan. Without obligation, a trained BFG man will study your materials handling operations. He'll recommend the right type tires for you to use—solid, semi-pneumatic or pneumatic. He'll tell you what tread design is best—smooth, directional, non-directional—and if a special tread compound should be used.

Follow the TW Analysis man's advice and you can save as much as 50% on industrial tire costs. And his maintenance tips can cut your bills up to 20%. His advice is impartial, for B. F. Goodrich makes, and BFG retailers sell, a complete line of industrial tires.

To find out more about this free B. F. Goodrich Tire and Wheel Analysis Plan, mail the coupon or call your BFG retailer. A special TW Analysis Plan is available for manufacturers of industrial handling equipment.

Specify B. F. Goodrich tires when ordering new equipment

The B. F. Goodrich Company
Department TW-152, Akron 18, Ohio

Please send me:

☐ *Additional information* on your new Tire and Wheel Analysis Plan

☐ A free copy of your "Industrial Tire Guidebook"

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DOW CHEMICAL saves *thousands of dollars annually* with BAKER TRUCKS

■ At the Pittsburg, California, plant of The Dow Chemical Company, five Baker Fork Trucks expedite handling of material in production, storage and shipping departments.

Two of these trucks transport 16″ cylinders of ammonia—twelve at a time—from production to warehouse and from warehouse to shipment, and load them directly into boxcars or highway carriers.

The remaining trucks speed handling of chemical products in bags or cartons on pallets—taking them from production to storage, where they are high-tiered to conserve floor space, and from storage to shipment, where further man-hour savings are made in loading.

Material was formerly transported manually and hand-stacked. Cylinders were rolled by hand, one at a time. The use of Baker Trucks has resulted in savings of thousands of dollars annually.

Write for *your copy of the "Baker Handling Library" a new portfolio of actual case histories.*

Baker industrial trucks

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1218 WEST 80th STREET • CLEVELAND 2, OHIO

The Baker-Lull Corporation • Subsidiary, Minneapolis, Minn.
Material Handling and Construction Equipment

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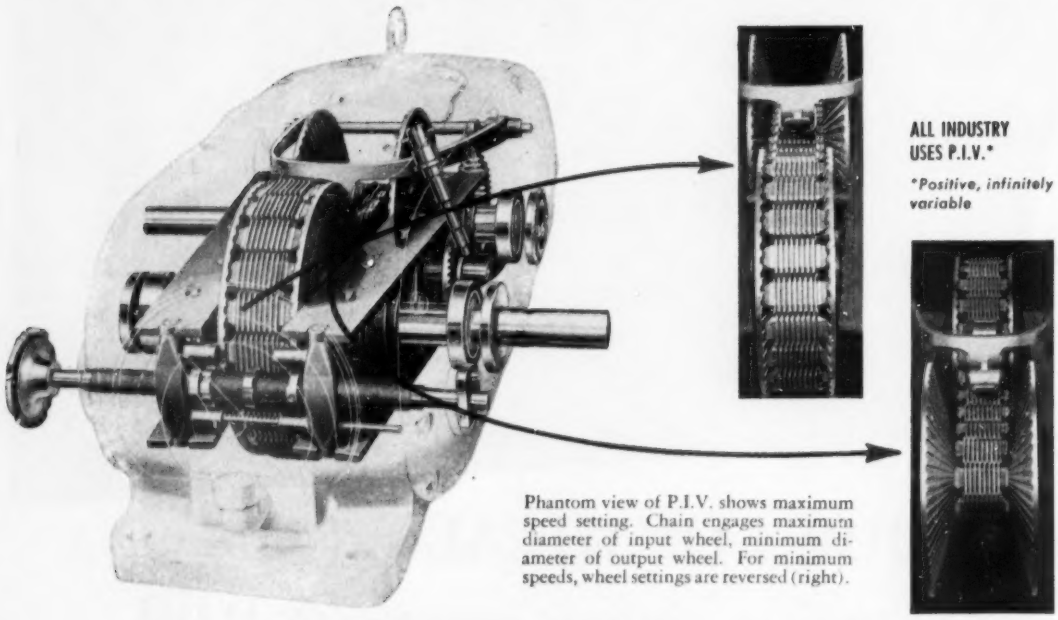
truly POSITIVE truly STEPLESS



Phantom view of P.I.V. shows maximum speed setting. Chain engages maximum diameter of input wheel, minimum diameter of output wheel. For minimum speeds, wheel settings are reversed (right).

ALL INDUSTRY USES P.I.V.*

**Positive, infinitely variable*

LINK-BELT's P.I.V. operates independent of friction ... gives you exact selection of an infinite number of speeds

TURN a hand wheel . . . push a button . . . or utilize fully-automatic controls. Link-Belt's P.I.V. Variable Speed Drive provides the speed you need—without stopping the machine. Speed changing is positive, stepless—accurate under full load. Speed choice is infinitely selective, effortless and precise.

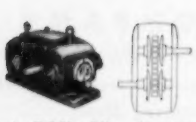
P.I.V. is not dependent on friction for power transmission. Link-Belt's exclusive self-tooth-forming chain meshes with grooved wheels to assure positive power transmission at all speeds. Full-rated horsepower is constantly delivered to your machines.

If your manufacturing processes demand variable speed control, get all the facts about these compact P.I.V. Variable Speed Drives. There's an experienced power transmission engineer in the Link-Belt office near you. Call him today. Send for Catalog No. 2274.

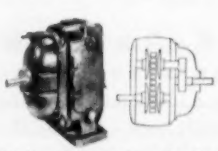
LINK-BELT P.I.V. VARIABLE SPEED DRIVE

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices, Factory Branch Stores and Distributors in Principal Cities. 13,117

4 of 16 P.I.V. types you can choose from. ½ to 25 hp ... ratios to 6:1

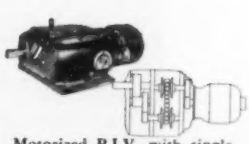


Basic P.I.V. Like all others, it is built for horizontal or vertical mounting.



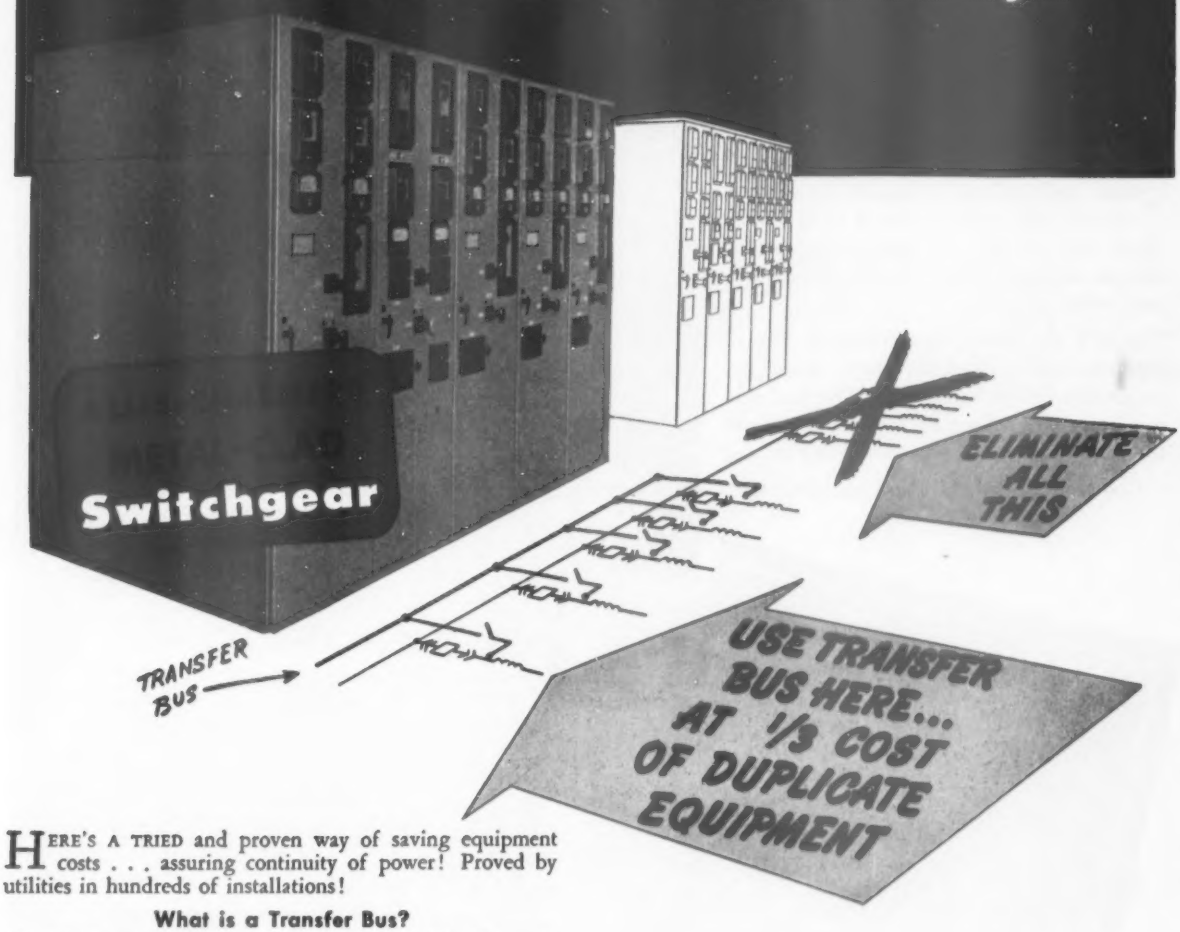
P.I.V. with single reduction input or output helical gears.

Motorized P.I.V. with single reduction input and output helical gears.



Motorized P.I.V. with single reduction input and double reduction output helical gears.

Why Buy Duplicate Switchgear to Assure Power Continuity?



HERE'S A TRIED and proven way of saving equipment costs . . . assuring continuity of power! Proved by utilities in hundreds of installations!

What is a Transfer Bus?

It's simply a by-pass bus circuit that parallels the main switchgear bus. A switching means is provided so that loads can be transferred to the transfer bus. It's a standby in case anything happens to the main bus. Also, makes it possible to withdraw and maintain circuit breakers, or inspect main bus without power stoppage.

What are Other Advantages?

1. Saves Cost. Transfer bus costs about ⅓ as much as the additional equipment needed to provide duplicate switchgear to do this same job.
2. Cuts Space in Half. Allis-Chalmers supplies transfer bus in same cubicle as switchgear without adding cubicles. Thus an Allis-Chalmers installation cuts space one-half.

In addition, you can insure against failure of power source by providing a double end feed with the one set of switchgear and be as sure of power supply as if you had duplicate switchgear.

Depending on the job you want to do, there are many arrangements that Allis-Chalmers can provide. In many cases, the engineering has already been done.

Ask an Allis-Chalmers engineer about transfer bus arrangements and what they can mean to your plant in savings and service. Call your nearby Allis-Chalmers district office, or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3731

ALLIS-CHALMERS

First in the U. S. with Metal-Clad Switchgear

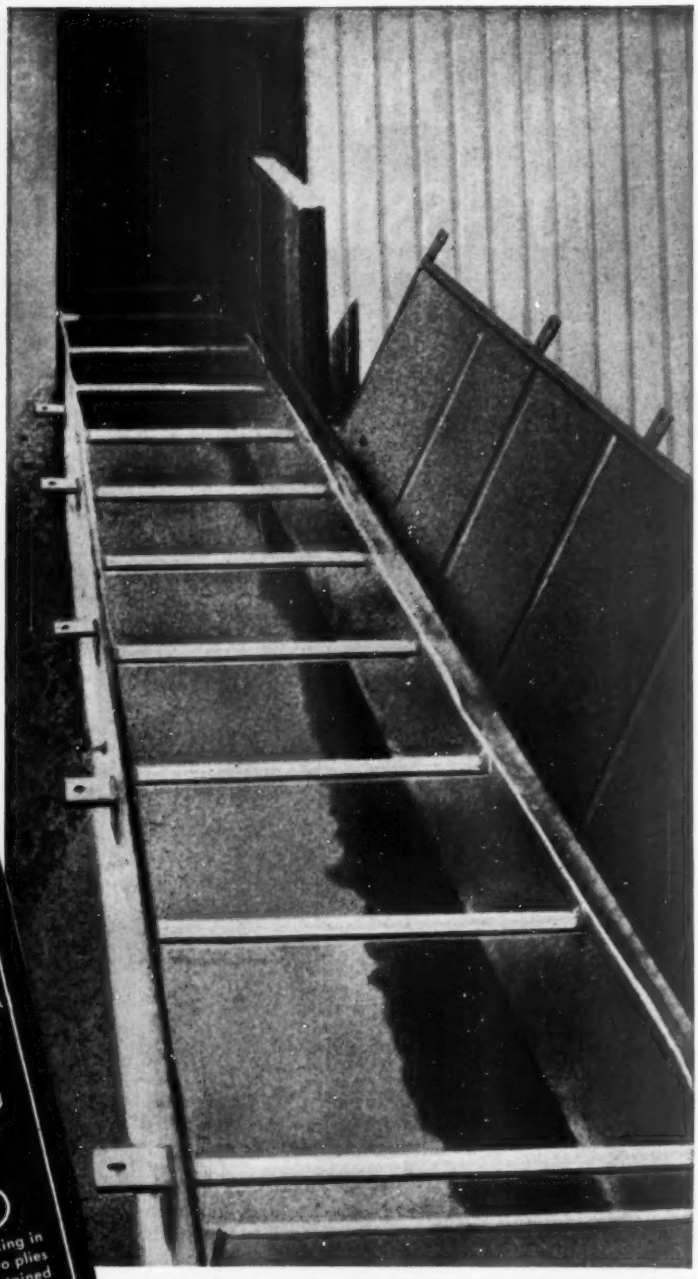
SIX TIMES THE SERVICE

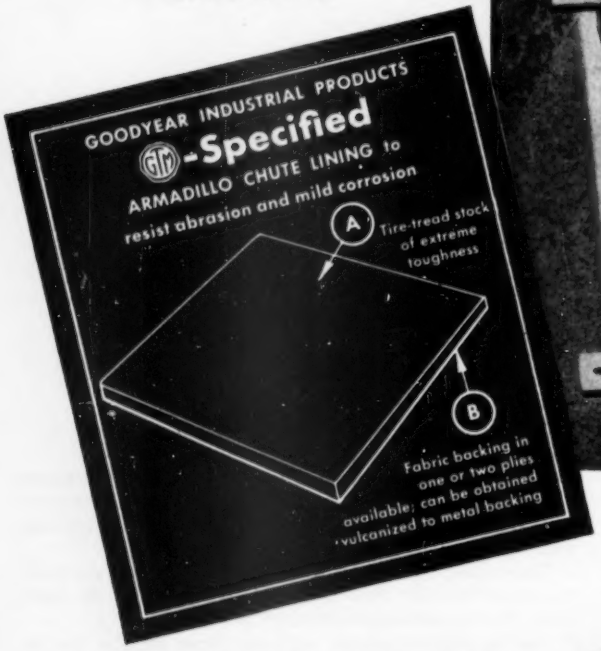
ARMADILLO Chute Lining Outlasts Steel In Chute Handling Sand and Gravel

STEEL chutes used to handle sand and gravel were failing after 4 to 6 weeks. Chute was 16′ long, ¼″ gauge metal—handled an average 200 tons hourly during six-day week.

The G.T.M. – Goodyear Technical Man – recommended lining the chute, using ½″ gauge Armadillo chute lining. The first rubber lining has served six months—*six times the service of metal and still going strong.*

Goodyear, Industrial Products Division
Akron 16, Ohio




GOODYEAR INDUSTRIAL PRODUCTS
GTM-Specified
ARMADILLO CHUTE LINING to
resist abrasion and mild corrosion
A
Tire-tread stock of extreme toughness
B
Fabric backing in one or two plies available; can be obtained vulcanized to metal backing

YOUR GOODYEAR DISTRIBUTOR *can quickly supply you with Hose (air, water, steam, oil, special), Belting (V-belts, transmission, conveyor, elevator), and other industrial rubber products. Look for him in the yellow pages of your Telephone Directory under "Rubber Products" or "Rubber Goods."*

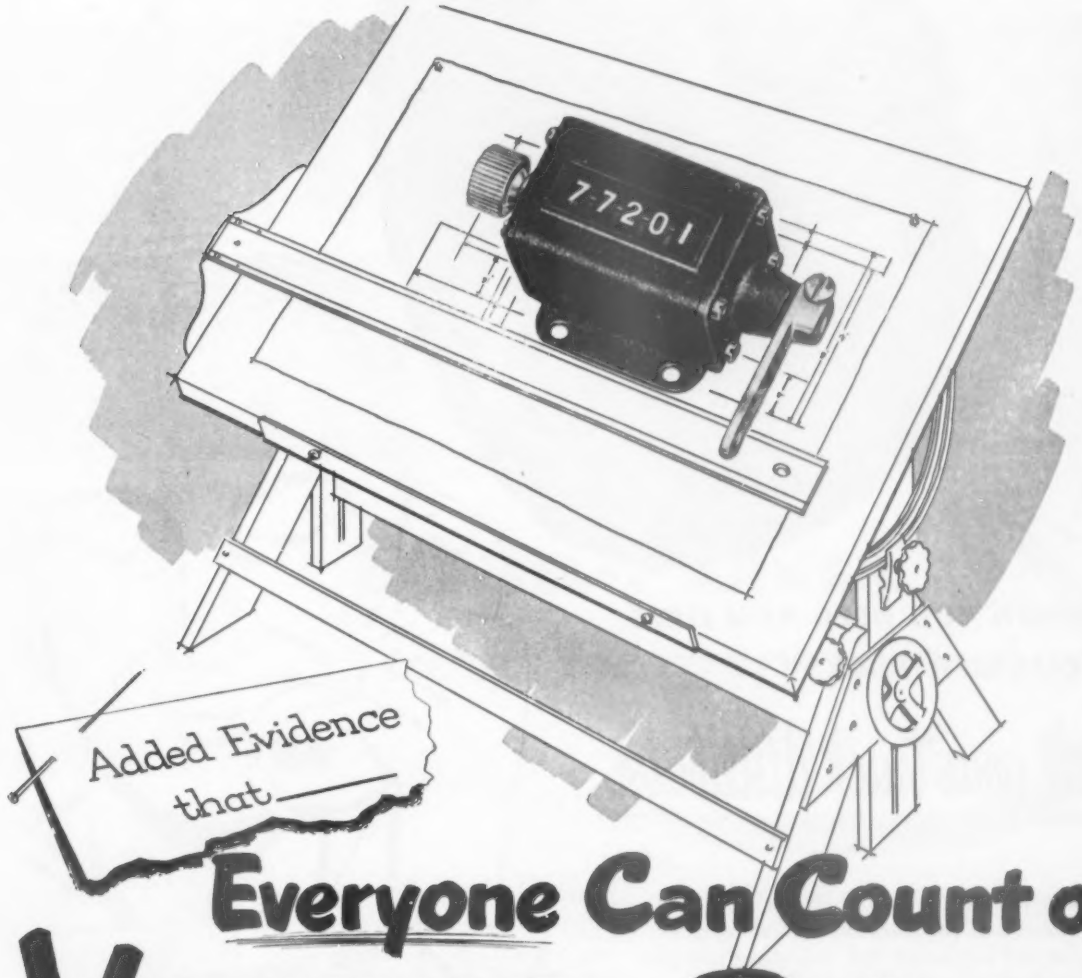
GOODYEAR

THE GREATEST NAME IN RUBBER

Armadillo–T.M. The Goodyear Tire & Rubber Company, Akron, Ohio

We think you'll like THE GOODYEAR TELEVISION PLAYHOUSE—every other Sunday—NBC TV Network

Nothing You Build Into Your Product *Can Count for More!*



Added Evidence that—

Everyone Can Count on VEEDER-ROOT

This compact Reset Counter, shown actual size, is a standard built-in part of many makes of business machines, cameras, coin machines, compressors, die casting machines, hay balers, laundry equipment, plastic molding machines, punch presses, shoe machines . . . and what have *you*? It counts turns, strokes, pieces or other units of performance and output . . . supplying facts-in-figures that help toward closer *Count*rol. Find out how *your* product can give your customers a *new usefulness*, with these or other Veeder-Root Counters for mechanical or electrical operation. Write:

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"The Name that Counts"

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MOST TRUCKS COME EQUIPPED WITH Mono-Cushions
Steady, floor-hugging, shock absorbing Monarch Mono-Cushions . . . the King of the lift truck tires, gives your trucks efficiency plus. Mono-Cushions float your trucks . . . are easy on drivers, floors and loads. Ask your truck distributor about them!

WHEN YOU NEED NEW TIRES FOR YOUR LIFT TRUCKS

Call your truck distributor

● When you entrust your lift truck repairs to your truck distributor, you know the finished repair job will be complete and satisfactory. But, how about new tires? Your truck distributor can re-equip your trucks with tires, too! He knows what's best for your trucks . . . that's why he stocks **Monarch Mono-Cushions.** Place all your truck service under one roof . . . let your truck distributor service them from seat . . . to **Monarch Mono-Cushion** tires . . . the tires that keep your trucks steady.

THE MONARCH RUBBER COMPANY
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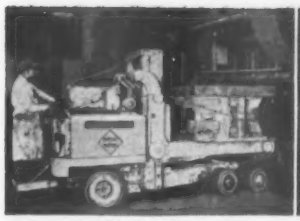
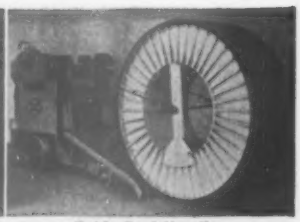
SPECIALISTS IN INDUSTRIAL SOLID TIRES AND MOLDED MECHANICAL RUBBER GOODS



Die Handler

Pallet Retriever

Upender



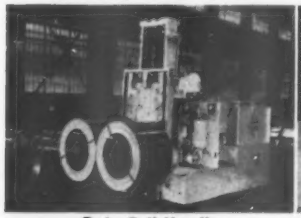
Cable Reel Handler

Side Dump Revolving Unit

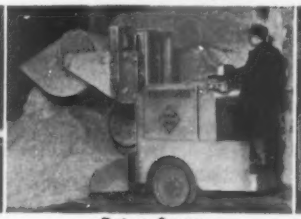
Roll Handler with Apron

Tin Plate Clamp

Bale Clamp



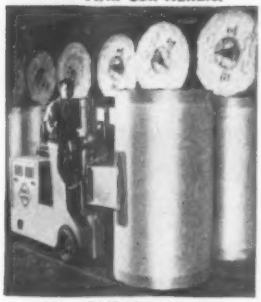
Twin Coil Handler



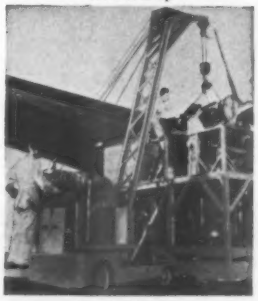
Rotary Scoop

Roll Piercing Truck

3-Ton Low Lift; 1-Ton Crane



Roll Clamp



Special Crane

Carton and Drum Handler

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trucks for every type of handling

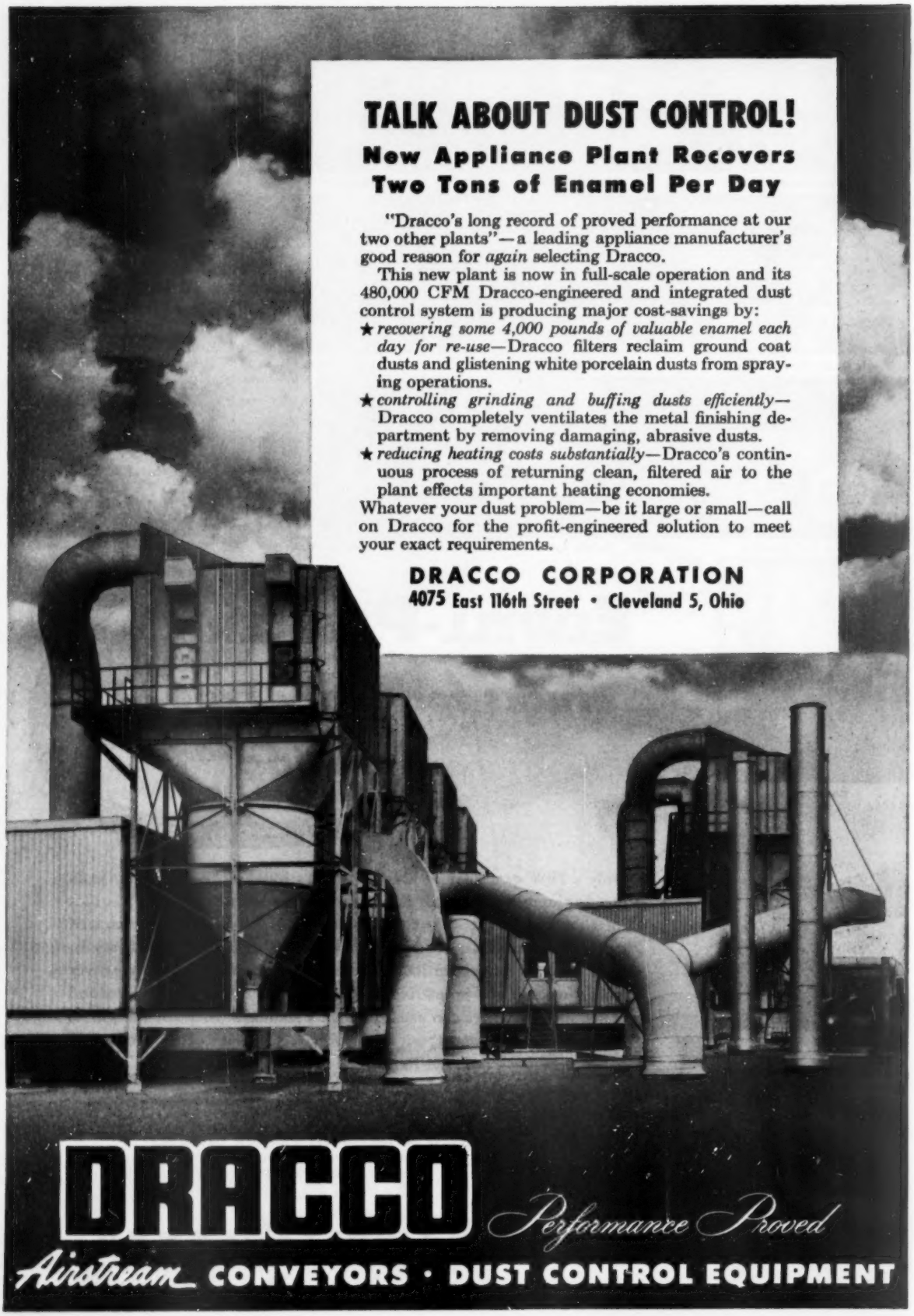
Only a FEW examples of Elwell-Parker's ingenuity and enterprise in meeting unusual materials handling requirements are shown . . . Not infrequently, the peculiar shape or nature of a load makes a standard truck impractical. In producing attachments or units for such needs, Elwell-Parker draws on its 45 years of experience supplying power trucks for over 300 industries . . . From its line of 87 different sizes and types, Elwell-Parker can usually select a standard truck for the job. If not, ask your E-P man about a unit precisely suited to your needs. The Elwell-Parker Electric Co., 4028 St. Clair Avenue, Cleveland 3, Ohio.

NEW ATTACHMENT FOLDER describes and illustrates in detail the many attachments for E-P fork trucks. Write for your copy.

ELWELL-PARKER

POWER INDUSTRIAL TRUCKS

Established 1893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New Appliance Plant Recovers Two Tons of Enamel Per Day
"Dracco's long record of proved performance at our two other plants"—a leading appliance manufacturer's good reason for *again* selecting Dracco.
This new plant is now in full-scale operation and its 480,000 CFM Dracco-engineered and integrated dust control system is producing major cost-savings by:
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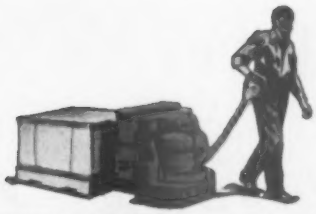
★ *controlling grinding and buffing dusts efficiently*—Dracco completely ventilates the metal finishing department by removing damaging, abrasive dusts.
★ *reducing heating costs substantially*—Dracco's continuous process of returning clean, filtered air to the plant effects important heating economies.
Whatever your dust problem—be it large or small—call on Dracco for the profit-engineered solution to meet your exact requirements.
DRACCO CORPORATION
4075 East 116th Street • Cleveland 5, Ohio
DRACCO
Performance Proved
Airstream CONVEYORS • DUST CONTROL EQUIPMENT

*TRANSVEYOR PALLET TRUCK—Has overall length of only 29½" (less forks), makes possible right angle storing of 48" x 48" loads from aisles narrow as 6½ feet. For greater utilization of floor space, quicker access to work areas. Platform type also available.



"101" TRANSPORTER—Moves tons of your product at the touch of a button... raises load to moving height in seconds... works all day for as little as pennies.

"101" TRANSTACKER—Ability to maneuver in crowded quarters makes this model ideal for working in narrow aisles, and where floor or elevator capacities are limited.

*TRANSVEYOR STACKER—2500 to 4000 lb. capacities. Lightweight, compact, maneuverable, rugged. A low-cost stacker for extreme close-quarter lifting, moving and stacking in 6 foot aisles...for limited-capacity floors and elevators.

*NEW STANDARD SKYLIFT—This is a brand new line of Automatic low-price Skylifts—1000 to 4000 lb. capacities—with more money-saving features than any other electric trucks.

Before you buy—

Let figures prove how much you save with

"KEYED-FOR-THE-JOB"

Automatic Trucks

There's only one RIGHT truck for each material handling job...Automatic makes them ALL...saves you money with trucks "Keyed-For-the-Job."

*NOTE THREE NEW TYPES. It will pay you to be sure you're getting a truck that's "keyed" for the specific job in *your* plant. For a truck too large, too small or in any way inadequate to handle your product, may not give you the substantial saving that would pay its cost in a reasonable time.

That is why, to assure industrial truck users that an Automatic will let you write off your investment quickly, Automatic offers many *more* advanced-type electric trucks, equipped with *more* ingenious devices for licking tough trucking jobs.

So you will find that for the lightest or heaviest product you may want moved, lifted or tiered, there is an Automatic electric truck "keyed" for the job.

On that, Automatic has built its materials handling cost-cutting reputation. So why not let Automatic show you the right truck for your particular job. Then, put Automatic trucks to work in your plant and *let the figures prove* how little they cost to operate and maintain.

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It takes only a few minutes to learn how much better your heating can be with American Blower Unit Heaters.

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Heavy-duty coils, unobstructed outlets for maximum heat diffusion, completely enclosed moving parts are but a few of the quality features which make these units outstanding. They carry Certified Ratings — and are sound-rated, too.

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CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of American Radiator & Standard Sanitary Corporation

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how to provide
PROTECTION · *PLUS*

for enclosed
gear drives . . .

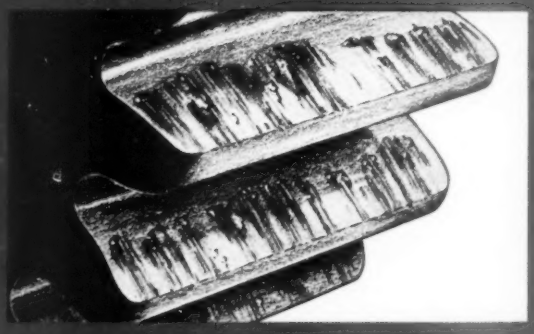
SWITCH TO GULF E.P. LUBRICANTS

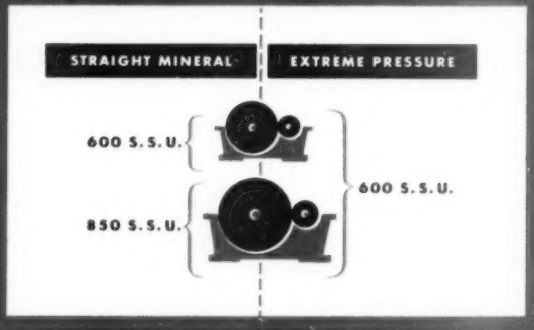
. . . and save maintenance dollars!

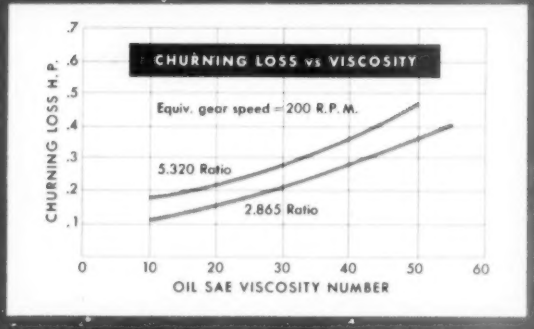
Gulf E. P. Lubricants combine all the properties that count in an extreme pressure lubricant: high film strength, excellent rust preventive properties, good water-separating characteristics, good stability, and they are noncorrosive, nonfoaming. Their use insures longer gear and bearing life and lower maintenance costs for gear drives under a wide range of operating conditions.

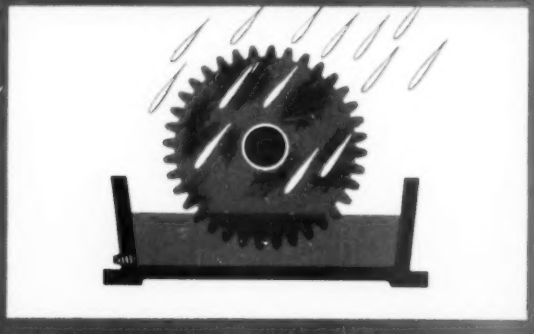
Gulf E. P. Lubricants are available in the proper viscosity for every gear requirement ranging from 55 to 1000 SUV at 210 deg. F. For specific recommendations for your equipment, call in a Gulf Sales Engineer today. Write, wire, or phone your nearest Gulf office or send the coupon on the last page.

GULF INDUSTRIAL LUBRICATION









Practical advantages of Gulf E. P. Lubricants:

More effective protection against tooth scoring and welding

Gulf E. P. Lubricants have proven ability to protect gear teeth against damage by scoring and welding. They are specially compounded to provide extra film strength and to prevent metal-to-metal contact under most conditions of overload and shock load.

That's why you can usually avoid tooth damage like that shown at the left when you use Gulf E. P. Lubricants. And that's why they provide an extra margin of protection when production demands approach or exceed the rated capacity of the equipment.

Fewer lubricant grades needed—lubricant storage and handling simplified

Because Gulf E. P. Lubricants have superior film strength, it is often feasible to use a lower viscosity grade than would be possible with a straight mineral oil. This is a practical advantage for plants operating several different types of gear drives. If, as pictured at the left, two straight mineral oils of different viscosity are specified, one grade of Gulf E. P. Lubricant may well do the job of both. Thus lubricant storage and handling is simplified, and there is less chance for confusion in the oil house.

Reduced power loss caused by churning in splash-lubricated units—lower power costs

There is another advantage in using a lower viscosity oil in splash-lubricated units where power loss due to churning is appreciable. Since this loss is almost directly related to oil viscosity, the use of lighter Gulf E. P. Lubricants often means reduced heat generation and lower power costs.

The chart at the left shows the effect of viscosity on the churning loss in horsepower of a typical gear unit.

Excellent protection against rust

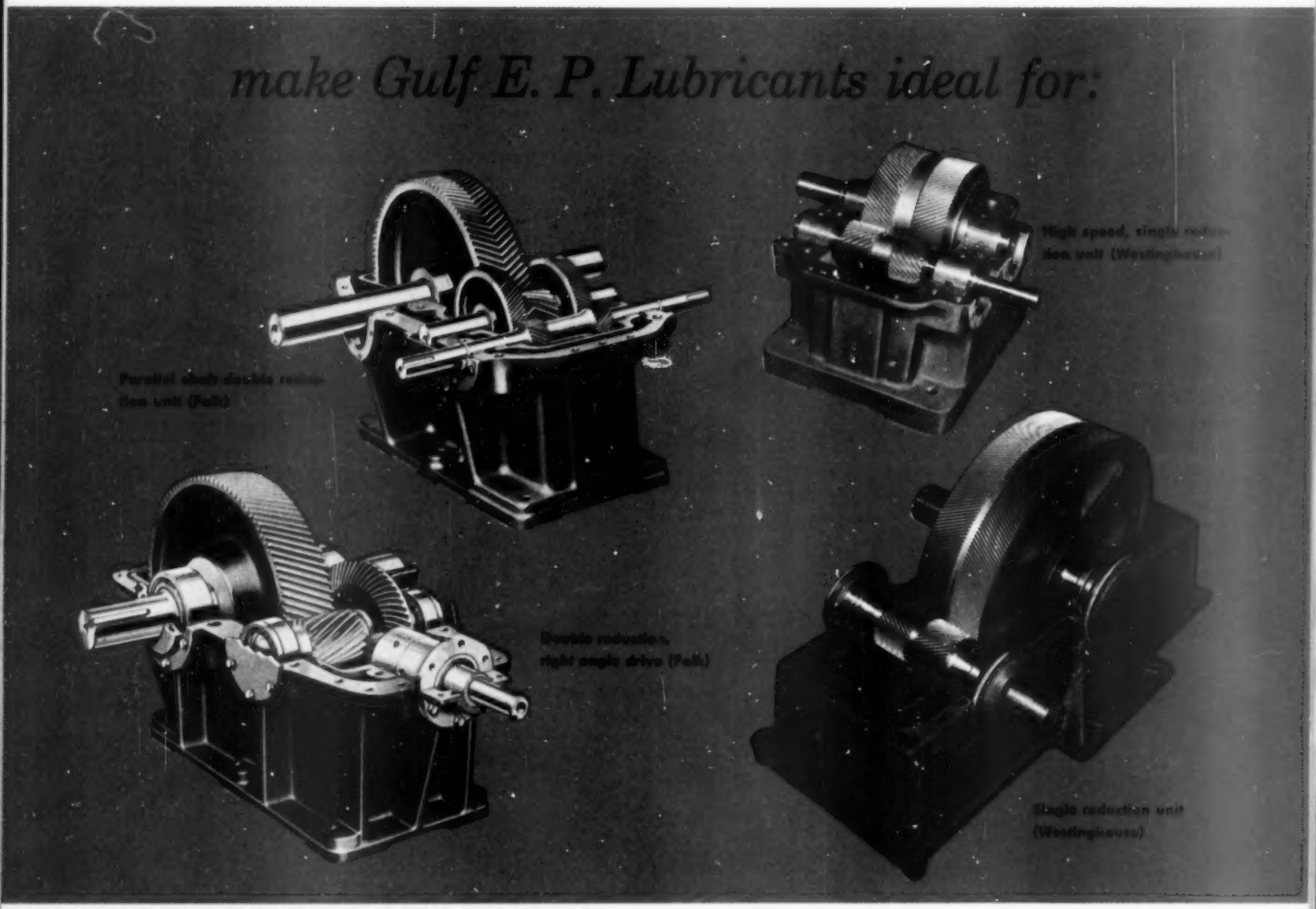
The ability to protect polished gear teeth and antifriction bearings against rust is an important property of a gear lubricant, and is essential in a lubricant for units which are occasionally idle.

Gulf E. P. Lubricants have highly effective rust preventive properties—insure against excessive wear and enlarged tolerances which might result from the presence of abrasive rust particles.

other advantages

- **good water-separating characteristics**
- **non-corrosive**
- **non-foaming**
- **stable for this type of lubricant**

make Gulf E. P. Lubricants ideal for:



Parallel shaft double reduction unit (Falk)

High speed, single reduction unit (Westinghouse)

Double reduction, right angle drive (Falk)

Single reduction unit (Westinghouse)

GULF OIL CORPORATION • GULF REFINING COMPANY
1822 Gulf Building, Pittsburgh 30, Pa.

Gentlemen:

I would like further information on Gulf E.P. Lubricants:

- ☐ Please have a Gulf Sales Engineer call.
- ☐ Please send me a copy of your pamphlet "Gulf E.P. Lubricants for Reduction Gear Drives."
- ☐ Please arrange to show a group in our plant the new Gulf Color Slide Film, "Gears and Their Lubrication," Part I.

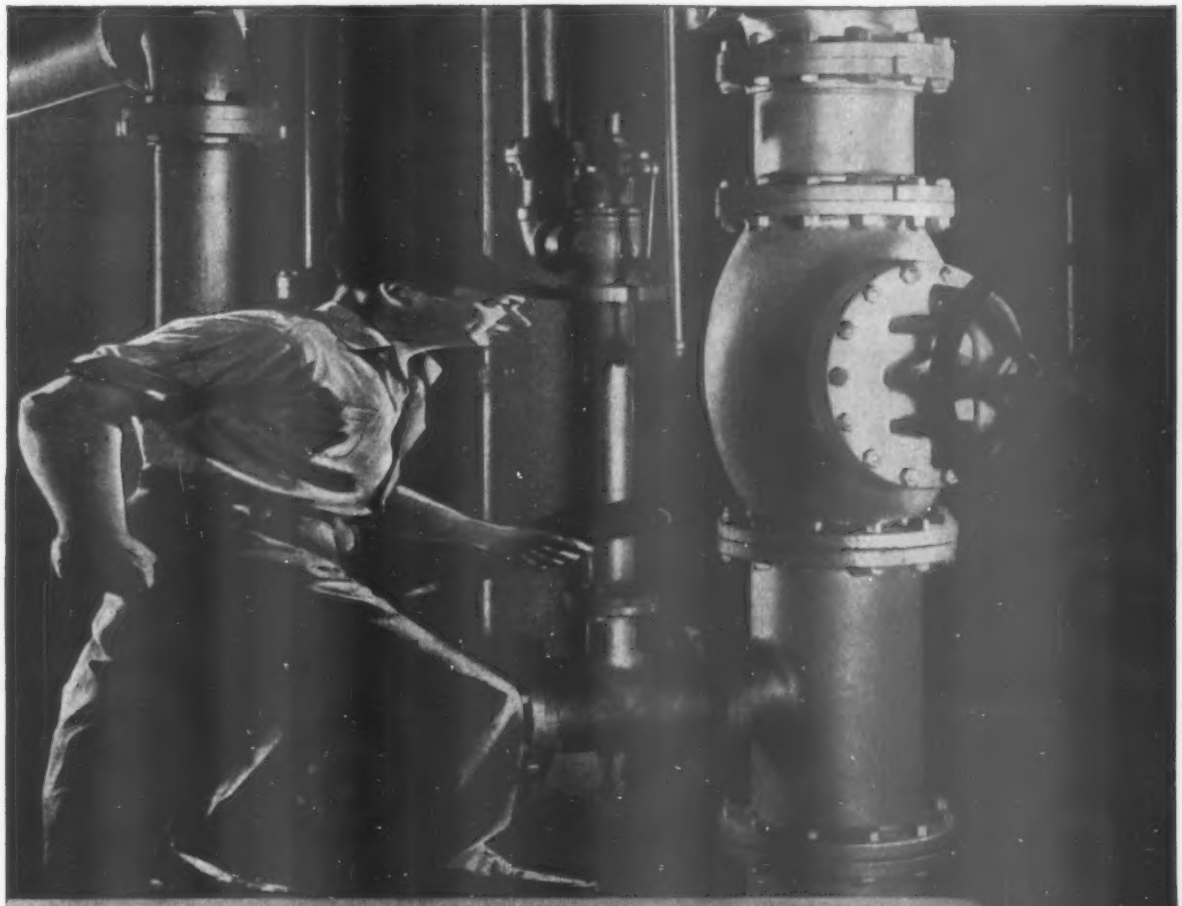
Name_____

Company_____

Title_____

Address_____

GULF INDUSTRIAL LUBRICATION



Squeezing the HIGH out of Mr. Overhead

Right now, a lot of plants are giving Mr. Overhead a thorough going over. And while in many areas nothing can be done about high costs, in others a little figuring may show big chances for economy.

Take piping maintenance for instance. At today's labor rates, the cost of servicing inferior and obsolete piping equipment is higher than ever. But it can be reduced—quickly—with better quality equipment that also strengthens your guard against production losses.

Thrifty buyers know this—that's why they insist on Crane Quality equipment. They know it assures longer life, greater dependability, lower ultimate cost . . . and that Crane provides the best selection for the piping needs of every industry.

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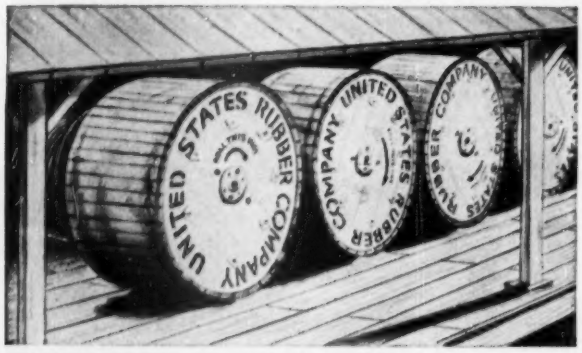
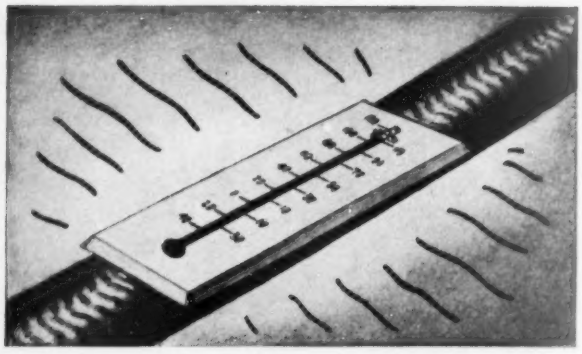
VALVES • FITTINGS • PIPE • PLUMBING • HEATING

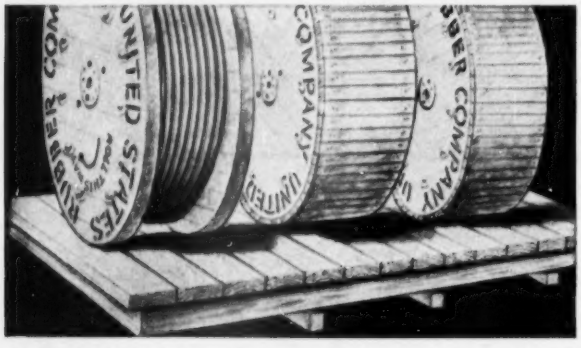
How to prolong the life of wire and cable by proper storage

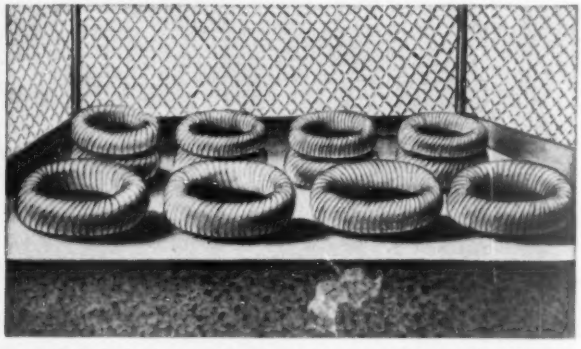




1 **Protect cables from the weather.** Moisture is especially injurious to fibrous coverings. When stored out-of-doors, if they become wet and then freeze, they will be weakened and the saturant will flake off. In humid weather, mold growth is accelerated, weakening the covering and making it easier to damage the cable during installation. (Rubber and thermoplastic insulated and jacketed cables may be stored under moderately humid conditions.) The larger sizes of fibrous covered and rubber jacketed cables and all lead-sheathed rubber insulated cables must be stored on reels which must be properly lagged—or the cable must be otherwise suitably protected against mechanical damage. Reels can be stored out-of-doors if the cable is protected against sun and weather, and the ends are properly sealed.

2 **Don't expose wires and cables to extremes of temperature.** Chemical reactions occur at a higher rate at high temperatures than low. The greatest deterioration of low-voltage cables is due to chemical changes, oxidation or internal changes in the compound itself. Never store reels in the boiler room unless you use a fan to blow hot air away from the wires and cables. It's best to store cables at room temperatures indoors out of direct sunlight. Rubber insulated cables may be stored and handled without damage at the lowest temperatures ordinarily encountered, but thermoplastic synthetic insulated cables should not be handled at temperatures below –10 C. (14 F.)





3 **Reels should be kept off the ground,** so that moisture will not harm the cables, reel flanges and lagging. Sound reels are easier to handle and there is less chance of injury to the cable as it is removed from the reel.

4 **Coils should be stored one layer deep on the floor or shelves,** with the axis either horizontal or vertical. To save space, they may be stacked, but not more than 5 coils in height—otherwise there is harmful pressure on the insulation. Don't remove brown paper or box that protects against dust and light until used.

5 **Rubber insulated fibrous covered, rubber jacketed or lead-sheathed cables in storage** should never be bent to a diameter less than I.P.C.E.A. recommended diameters. Never let coils or reels drop more than a few inches. Always roll a reel in the direction indicated by the arrow on the flange. When rolling an unlagged reel, put planks under the flanges to avoid pressure on the cable. Coils, reels and spools should always be rotated when wire and cable is removed to avoid twisting the cable.

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SERVING THROUGH SCIENCE

Electrical Wire and Cable Department

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Right now you're planning a maintenance painting job. Plan it with an eye to the future as well as to the present.

Let us say . . . and we can *prove* it with an on-the-wall test . . . that Barreled Sunlight will do the job better and for less money. Less money for paint . . . because Barreled Sunlight takes more thinner and covers more area per gallon. Yes, and less money for labor — the really costly part of every painting job — because Barreled Sunlight goes on faster and easier and covers better in fewer coats.

But of equal if not greater importance, paint now with Barreled Sunlight and you'll save money in the years to come. You'll repaint less often, because a Barreled Sunlight job keeps its clean, fresh-painted look years longer. And when you do repaint Barreled Sunlight over Barreled Sunlight, one coat is all that's necessary for a perfect repaint job.

Think of your future, right now. Use Barreled Sunlight right now. Your nearest Barreled Sunlight representative will be glad to show you how right you can be. Write, and he'll call.

BARRELED SUNLIGHT PAINT COMPANY

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Barreled Sunlight® Paints

In whitest white or clean, clear, wanted colors, there's a Barreled Sunlight Paint for every job

IT ALWAYS COSTS MORE NOT TO PAINT!

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Quick-connective couplings are their business—

BUT SO ARE FLUID LINE PROBLEMS

KENNETH E. KNOTTS
K. E. Knotts Co., Newark
Has previously served as director of sales for leading manufacturers of fluid line control equipment.

KNOW THESE NEW

HANSEN

REPRESENTATIVES

To provide quickly available assistance on pneumatic and hydraulic problems, we have recently appointed additional Hansen representatives in the Eastern area. Like all other Hansen representatives, these men are trained specialists who have had years of experience in close contact with fluid line circuits in hundreds of plants.

If you aren't already making use of his know-how, call the Hansen man in your area the next time you run into difficulties. Frequently he can make suggestions to give you vastly improved performance from your present fluid line installation.

J. A. MOODY
J. A. Moody Co., Philadelphia
Equipped with a thorough background of pneumatics experience in both the manufacture and installation of fluid line accessories.

JACK M. HOWELL
Jack M. Howell Co., Baltimore
Now serving the Mid-Eastern Seaboard area. Offers technical know-how acquired from years of experience in the selection and use of pneumatic and hydraulic equipment.

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BUFFALO	HARTFORD	PHILADELPHIA
CHICAGO	KANSAS CITY	PITTSBURGH
CLEVELAND	LOS ANGELES	SAN FRANCISCO
DALLAS	LOUISVILLE	SAVANNAH
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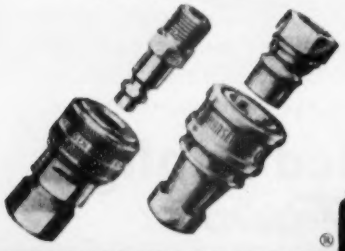
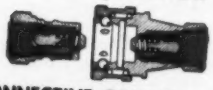


QUICK-CONNECTIVE FLUID LINE COUPLINGS

1. QUICK CONNECTION AND DISCONNECTION **2.** INSTANT AUTOMATIC FLOW OR SHUT-OFF

One-Way Shut-Off

Two-Way Shut-Off



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THE AMERICAN STORY

CHAPTER TWELVE

How to make a "STAINLESS REPUTATION"

For high-production manufacturers of automobiles, aircraft, appliances . . . and of chemical, medical, electrical, railroad and building equipment . . . American makes a line of *stainless steel* machine, tapping, thread-cutting and wood screws. Other types are available (and more will be added) . . . all made to American standards of quality and precision, all underwritten by American's engineering-research service. If *you* need standard or special stainless fasteners in quantity, *ask American first* . . . and see why this name is one of the brightest in this important new field of the fastener industry. Write:

SINCE 1938

AMERICAN SCREW COMPANY

PHILLIPS HEADquarters

WILLIMANTIC, CONNECTICUT

Main Office & Plant
Willimantic, Conn.
Office & Plant, Norristown, Pa.
Office & Warehouse, Chicago, Ill.

A Customer Reports:

"We use Continuous-Cast Bronze because of its Uniform Quality"

MANNING, MAXWELL & MOORE, INC., (Shaw-Box Crane and Hoist Division) Muskegon, Michigan, manufacturers of cranes, hoists and specialties, says also that ASARCO bronze lends itself admirably to production on automatic screw machines.

ASARCO Continuous-Cast Bronze is used for the gear center of the brake gear in this company's "Budgit" portable electric hoist because its high physical properties far exceed those of ordinary foundry or mill products. Stock is consistently uniform in size and quality. Porosity is non-existent.

Since the patented ASARCO continuous casting process excludes sand, dirt, dross and other impurities, there are no inclusions in ASARCO bronzes to injure tools or reduce high cutting speeds. Rejects are virtually unknown . . . machining on automatics is standard practice.

All stock for machining is Medart-straightened and furnished within a general tolerance of +0.004" to —0.006" on outside diameters. Tube concentricities are within 1.5% of wall thickness.

Continuous-Cast Bronzes are made to order in a wide variety of alloys . . . in standard lengths of 12' . . . lengths 5' to 12' on request . . . lengths 12' to 20' by special arrangement.

216 sizes and shapes of standard Asarcon 773 bearing bronze (SAE 660) are stocked in 105" lengths for convenience at warehouses in principal cities across the country. Distributors will cut this stock long or short to suit your needs.

West Coast Sales Agent:
KINGWELL BROS. LTD., 457 Minna Street, San Francisco, Calif.

American Smelting and Refining Company
OFFICES: Perth Amboy Plant, Barber, New Jersey
Whiting, Indiana

ASARCO
CONTINUOUS-CAST
RODS · TUBES · SHAPES
®

TOWMOTORS IN ACTION IN U. S. INDUSTRY

Towmotor "hits the spot" with a pallet load of syrup at plant of East Chicago (Indiana) Pepsi-Cola Co.

PALATABLE LOAD

Palletable or palatable—it makes no difference whether you're handling hard goods or soft drinks, Towmotor loads, unloads, stacks, stores, delivers, and ships more kinds of materials in more ways, more quickly, more economically, more easily. Towmotor makes your operations look better literally and figuratively.

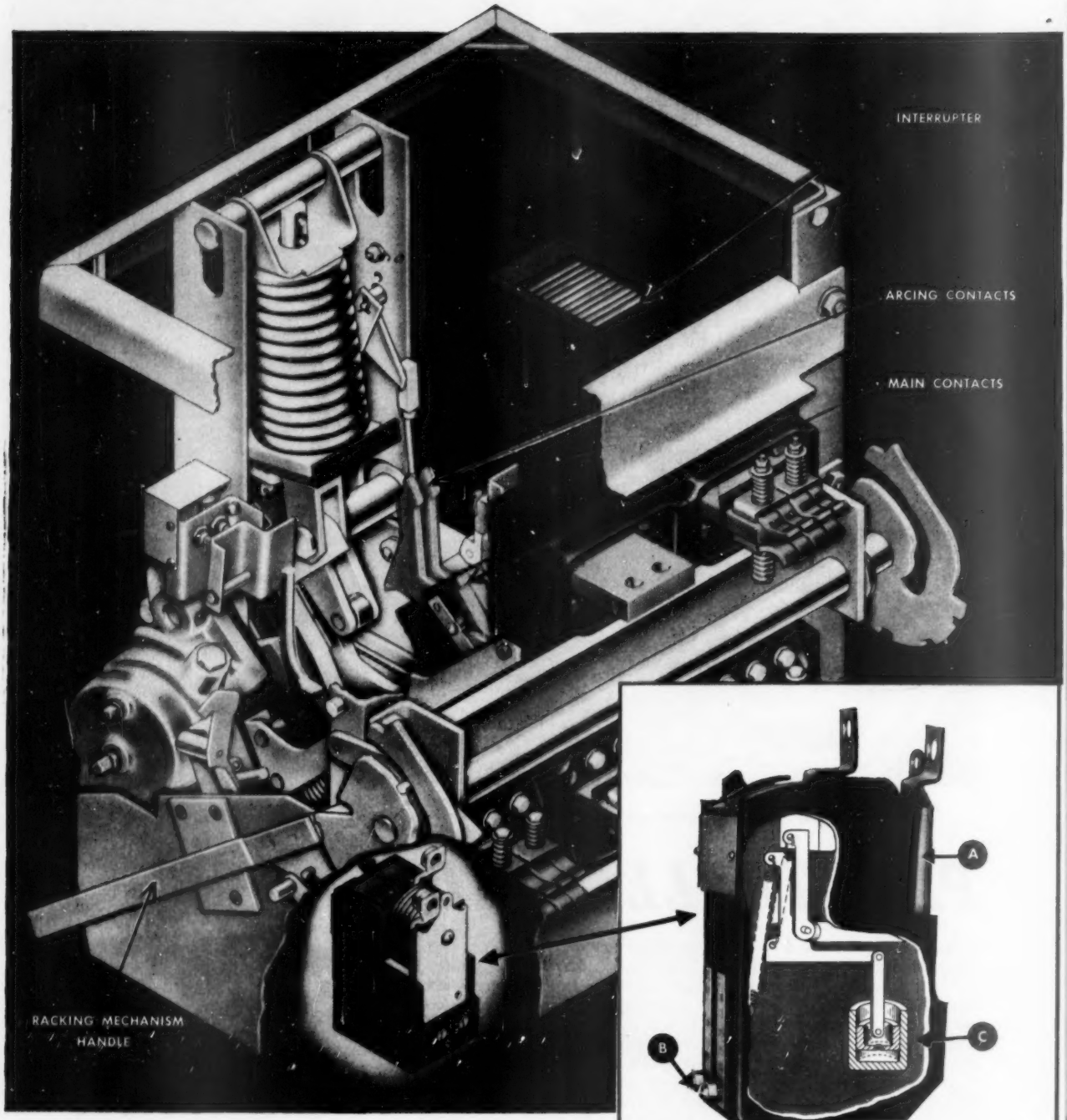
You'll want Towmotor, with new Power Steering that increases driver stamina by reducing steering effort 80% . . . with the new "Cushioned Power" Diesels that deliver more power and save fuel costs . . . and with the many other Towmotor features that make Towmotor the best buy for your boss and best by far for you! Send today for free booklet, "What Makes It Tick?" TOWMOTOR CORPORATION, Div. 509, 1226 East 152nd Street, Cleveland 10, Ohio.

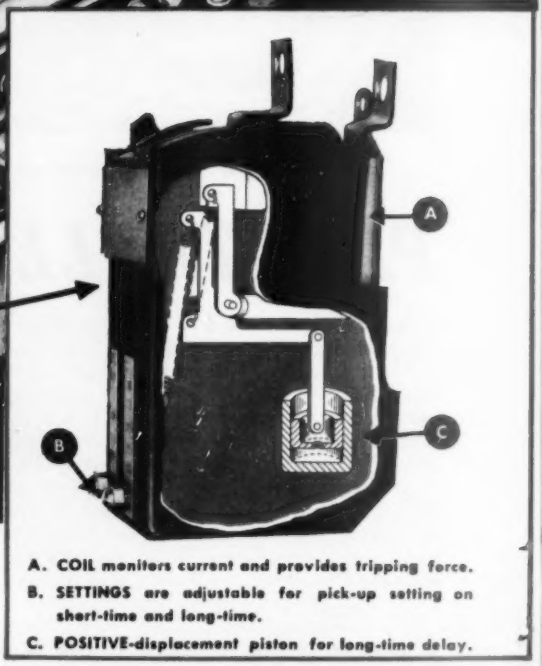
TOWMOTOR
THE ONE-MAN-GANG ®

FORK LIFT TRUCKS AND TRACTORS
Since 1919

TOWMOTOR ENGINEERED FOR QUALITY PERFORMANCE

New air circuit breakers





FOR SELECTIVE TRIPPING, the removable magnetic over-current trip device, in closeup at right, introduces delay into the tripping time of AK breaker, shown in cutaway above. Pickup of either the long-time or short-time element is easily adjustable. The device itself may be replaced by a factory-calibrated element to change current ratings.

A. COIL monitors current and provides tripping force.

B. SETTINGS are adjustable for pick-up setting on short-time and long-time.

C. POSITIVE-displacement piston for long-time delay.

give you *Selective tripping* up to full interrupting rating!

Reduce plant shutdowns by using a selective system

For the first time in the development of air circuit breakers, General Electric has made possible fully selective operation —with all units applied up to full interrupting ratings— throughout its *entire line* of Type AK breakers.

New Types AK-1-50, AK-1-75, and AK-1-100—the three new breakers with *interrupting* ratings of 50,000 . . . 75,000 . . . and 100,000 amperes—together with the AK-1-15 and -25 all have 30-cycle momentary ratings equal to their interrupting ratings. This exclusive G-E development means breakers do *not* have to be derated when applied in a selective system.

Built-in magnetic over-current tripping devices provide selective tripping of the breakers to isolate faults. All breakers have direct-acting, magnetic tripping devices which do not require current transformers. The trip devices provide three tripping functions: long, short-time delay, and instantaneous, in whatever combination required for different applications.

Outstanding design features of the new AK breakers are highlighted by G-E exclusives—

Stored-energy closing mechanism—for safer, surer closing even though control power is lost during closing operation. A G-E exclusive.

Selective operation—up to full interrupting rating, another G-E exclusive.

Multi-slot interrupters, exclusive with G.E., provide faster, safer, arc extinction.

Interchangeable parts—on new breakers cut down your parts stocking problem and simplify maintenance.

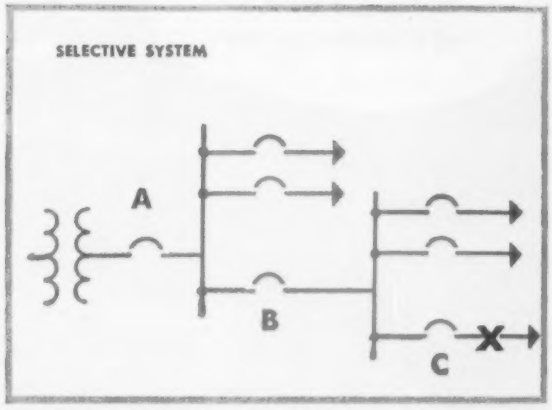
Racking mechanism—is part of breaker and permits inspection outside compartment away from live parts.

New equipments—designed and tested to withstand up to 100,000 amps. Design improvements give you many new features and benefits.

New breaker-handling windlass—is designed as integral part of units. Optional for both indoor and outdoor equipments.

For details on the new low-voltage AK breakers and the new low-voltage drawout switchgear equipments—ask your G-E sales representative for Bulletins GEA-5915 and GEA-5916, or write to General Electric Company, Schenectady 5, N. Y.

873-3



SELECTIVE TRIPPING with G-E system up to full interrupting rating isolates a fault at X by opening only breaker "C," leaving rest of system in operation. With a cascaded system, a fault at X may trip breaker "A" and shut down the whole system.

WITH RACKING MECHANISM, operator can easily pull out G.E.'s new air circuit breaker from compartment. All AK breakers and drawout switchgear equipment are fully co-ordinated in design.

You can put your confidence in—

GENERAL ELECTRIC

When you buy steam, hot water

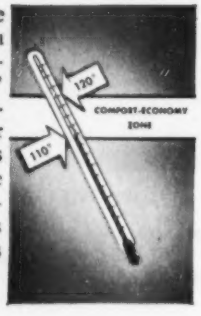
STEAM OR HOT WATER UNITS
—featuring a great, new line of Modine Verticals

LOOK 'EM

Great, new, improved Modine Vertical Unit Heaters are quieter, lighter, have higher output. Modine also offers a full line of horizontal delivery units.

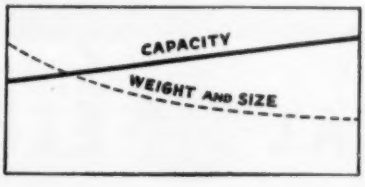
LOOK FOR CORRECT DISCHARGE TEMPERATURES

New Modine Verticals give you discharge air temperatures of 110° to 120° F. correctly related to air velocities. This combination is the key to perfect heating comfort plus lower fuel costs for you.



LOOK FOR GREATER CAPACITY — LIGHTER WEIGHT — LOWER INSTALLED COST

New Modine Verticals provide greater heating capacity because of new high efficiency condenser design. Yet, these *stepped-up* Modines weigh far less, are easier to handle, cost less to install.



LOOK FOR THE BROADER LINE

You have more sizes to choose from when you choose new Modine Verticals. This means it is easier for you to meet specific temperature, air delivery, and location requirements. *But see for yourself!* Call the Modine representative listed in your phone book or write for Bulletin 153 on Modine Steam and Hot Water Unit Heaters today.

or gas-fired unit heaters....

ALL OVER!

GAS-FIRED UNITS

— Only Modine has stainless steel heat exchangers *and* burners

Modine Gas-Fired Unit Heaters are built in a full line of popular sizes. All are A.G.A.-approved for natural, mixed, manufactured, L.P. and L.P.-air gases.

LOOK **FOR EASY INSTALLATION**

Advanced stainless design makes Modines 50% lighter in weight — more compact — than the average of seven other leading makes. Installation is faster, easier — no need for special structural supports. On one job, it cost the heating contractor $600 less to install 66 Modines than conventional units — savings he passed on to the owner.

LOOK **FOR TOP PERFORMANCE**

Not only do Modine units resist corrosion—all tubes heat uniformly because they're individually fired. Burners have elongated ports with four times the free area of ordinary drilled ports for maximum combustion efficiency. Remember: with Modines you are *sure* of getting full rated capacity.

LOOK **FOR ALL-AROUND VALUE**

As the leader in the development and application of steam and hot water unit heaters for more than 25 years, Modine brings unequalled experience to gas unit heating problems. It is the only manufacturer to publish heat throw data for gas-fired units. For facts, ask for Bulletin 651. Modine Mfg. Co., 1505 DeKoven Avenue, Racine, Wisconsin.

U-1203

Modine UNIT HEATERS

At Last! A Dead-High Hiding Over Dry-Wall

EXCELLENT FOR WALLBOARD SURFACES

Save money and valuable hours painting dry-wall, wallboard, plaster and all similar surfaces. Ultra Flat covers and seals seams, serving as a primer and finish in one coat.

Flat Wall Paint That Gives Construction!

NEW GLIDDEN PROFESSIONAL ULTRA FLAT LATEX FINISH

Solves toughest paint problems —provides wide color choice —at low cost

This is it! The first flat wall paint to combine economy, speed and one-coat application with sealing and covering qualities never before attainable! This new finish —with its exclusive latex vehicle—is another development of Glidden paint research.

- **Dead-flat finish minimizes wall surface imperfections . . . no glare . . . no "flashing". . . no efflorescence.**
- **No objectionable odor . . . no fumes . . . no fire hazard.**
- **No laps . . . no brushmarks . . . touch-up later without a trace.**
- **Dries in ½-hour.**
- **Can be brushed, rolled or sprayed.**
- **Greater washability than required by Government Specifications . . . leaves no shiny spots after washing.**

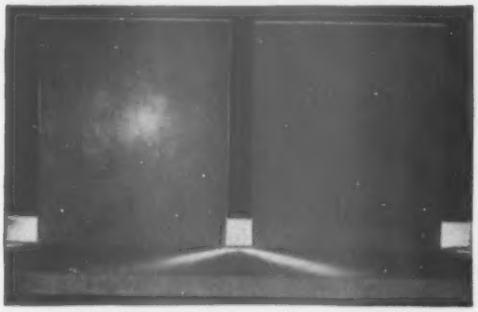
WRITE FOR COLOR CARD

Professional Ultra Flat is available in 10 popular colors and white—pastels and deep-tones obtainable by inter-mixing.

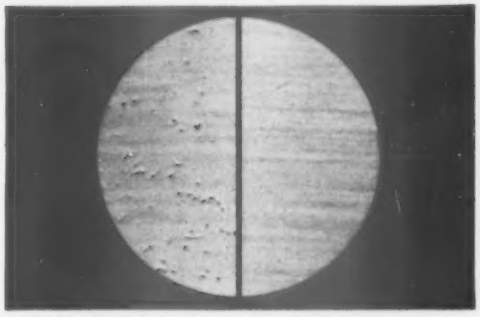
Another First for

Glidden

Pacemaker in Paints



Superior Hiding Power! Glass test panel at left is coated with a popular high quality flat—glass panel at right with Ultra Flat. When 300-watt bulb is lighted behind each panel, Ultra Flat blocks rays completely.



Superior Nap Control! Photomicrographs prove that the smooth, tight film of Ultra Flat (right) lays the nap on wallboard, while standard flat primer (left) raises and stiffens nap.

Superior Stain Sealing —Here Ultra Flat is covering and sealing a severely water-stained wall area in one coat.

SEND COUPON TODAY!

THE GLIDDEN COMPANY, 11001 Madison Avenue
Dept. FM-953, Cleveland 2, Ohio

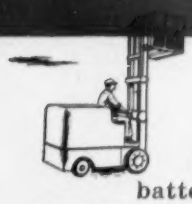
Please send me a free Professional Ultra Flat Latex Color Card!

Name .....

Address .....

City ..... *State* .....

INSIDE AN EXIDE-IRONCLAD



Inside . . . where it counts most . . . EXIDE-IRONCLAD is entirely different than any other battery. It's made that way by EXIDE'S exclusive IRONCLAD slotted-tube construction . . . a principle that provides direct operating-hour savings for you.

OF *ALL* BATTERIES, ONLY EXIDE-IRONCLADS HAVE POWER TUBE POSITIVES

The positive plate is different . . . unique . . . exclusive. It is the most effective retainer of active material yet demonstrated in heavy duty service. Slotted tubes contain the active material. So fine are the slots that, while permitting easy access of electrolyte, they retard the active material from washing out, hold it during repeated cycles of charge-discharge, and the vibration of rough use.

Today's battery-powered equipment is being used harder than ever before. Unless the batteries have internal shock protection they tend to deteriorate under hard usage—both electrical and mechanical. Only Exide-Ironclad has the plus-protection of the tubular positive that can withstand today's more exacting and rigorous heavy-duty battery services.

Your EXIDE sales engineer will give you the factual inside story. See for yourself why *only* an EXIDE-IRONCLAD gives maximum day-after-day service under the most difficult operating conditions . . . *with a minimum of maintenance expense.*

THE ELECTRIC STORAGE BATTERY CO.
Philadelphia 2
Exide Batteries of Canada, Limited, Toronto

1888 . . . DEPENDABLE BATTERIES FOR 65 YEARS . . . 1953

Cross section shows relation of positive plate to separators and negative plate. Note the much greater exposure of active material to electrolyte as compared with that of the usual flat positive plate. This greater exposure makes possible the high power ability and uniform-voltage characteristics of the Exide-Ironclad. The negative plates have been made extra heavy to balance the increased capacity of the power tube positives.

Running through center of each tube is an alloy core which is cast with the heavy top cross bar. These form the sturdy, non-buckling grid. Both core and top bar are made of Exide's new corrosion-resistant Silvium, an alloy of silver, lead and other components, which adds greatly to plate's long life.

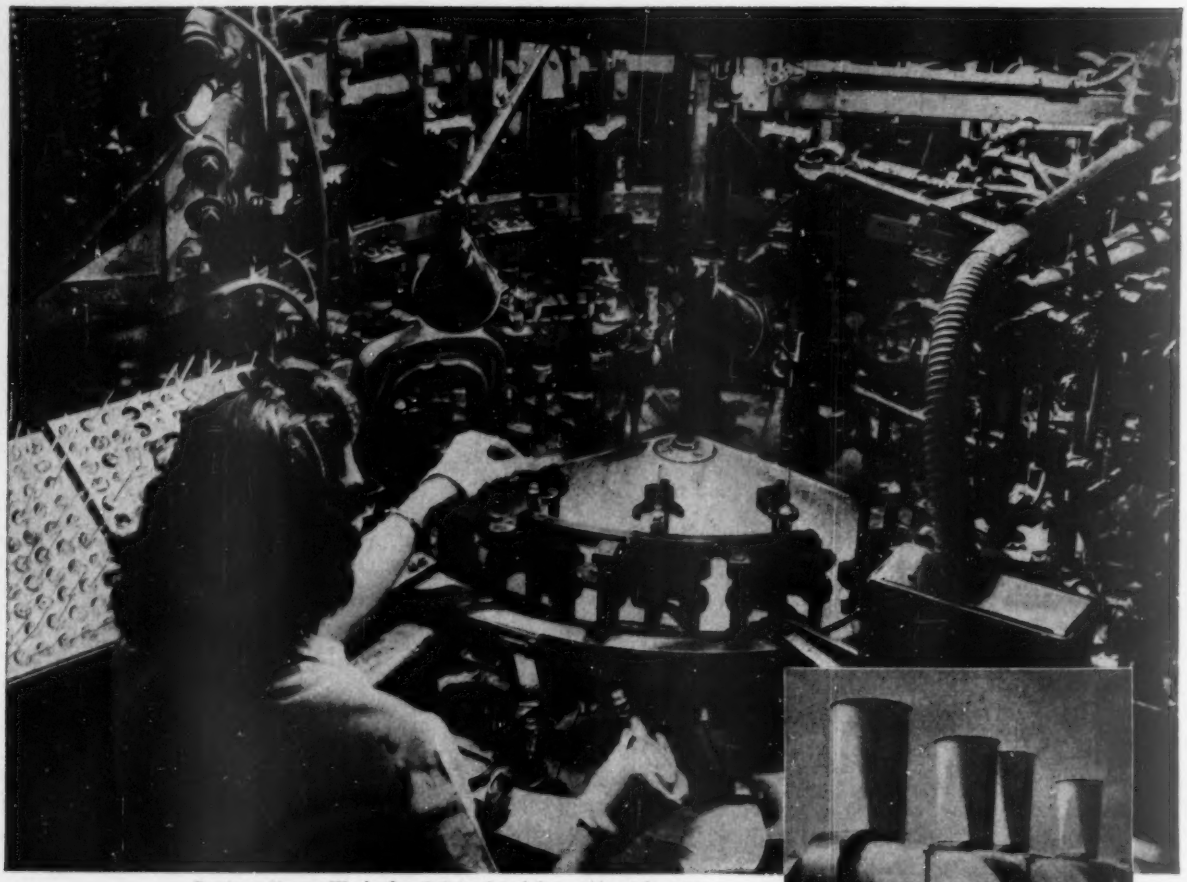
New polyethylene insulating tube sealer of acid-proof, non-corroding plastic fits snugly into bottom of slotted tubes and further reduces loss of active material. Thus more active material remains available, and the high battery capacity is maintained for a longer working life.

Exide-Ironclad

YOUR BEST POWER BUY . . . AT ANY PRICE

"Exide-Ironclad" and "Silvium" *Reg. T.M. U.S. Pat. Off.*

You'll Find The Difference



Putting Air to Work for RCA: Special machines for mass production each create 112,750 BTU's, cause special problems.

2,900,000 BTU EXHAUSTED

—OPERATORS STAY AT PEAK EFFICIENCY

Turning out miniature electron tubes is a hot business at RCA. Using a gas flame and induction heating, the process develops 2,931,200 BTU every hour. Exhausting this heat permits operators to work at peak efficiency.

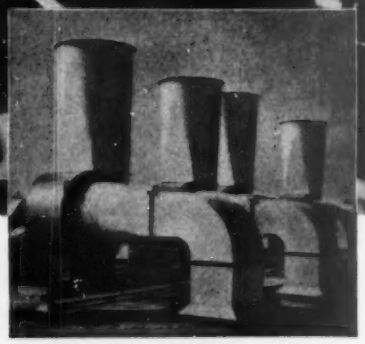
Dependable Westinghouse fans handle the heat removal. They're rugged, can easily take the intense heat. And they do it quietly, efficiently.

If *you* have a heat exhausting requirement, or need ventilation for any purpose, let us help you. Westinghouse makes the most complete line of air handling, air conditioning and electronic air cleaning products available. Call your Westinghouse-Sturtevant office, or write: Westinghouse Electric Corporation, Sturtevant Division, Hyde Park, Boston 36, Massachusetts.

WESTINGHOUSE AIR HANDLING

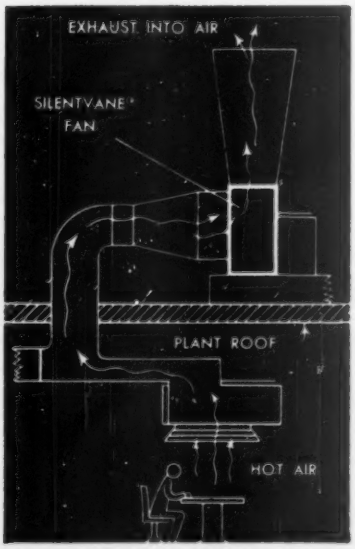
YOU CAN BE SURE...IF IT'S Westinghouse

J-80297



Ten Westinghouse fans exhaust the intense heat caused by flame jets and induction heating. This highly efficient Silentvane® fan does the job well, requires little maintenance.

Installed by Kirk & Blum Manufacturing Co., Cincinnati. Consulting Engineer: Paul P. Kopf, Philadelphia.



LOOK UP HERE

FOR EXTRA FLOOR SPACE...

The "SAVE-WAY" to move Materials is the *Ceiling Way!*

MANY plants are crying for extra floor area, yet not using half of their cubic footage. Except for piping, wiring and air circulation, the upper ceiling space is largely wasted.

The more activity that can be transferred to this overhead space, the more floor area will there be for other purposes. This permits adding more production tools without plant expansion, storing more materials, removal of floor confusion, increasing output and other advantages.

Materials handling is an activity that can be done very efficiently overhead. That is one reason why Cleveland Tramrail equipment is so popular. Not only does it serve well without using valuable floor space, but it speeds handling, greatly lowers cost and is a great aid to safety.

A Cleveland Tramrail engineer will be glad to discuss with you the "Save-Way" of moving materials, without obligation.

Investigate the Possibilities of

CLEVELAND TRAMRAIL

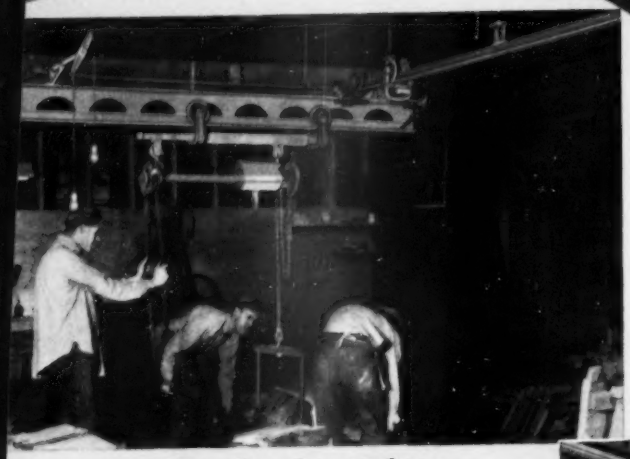
... the Overhead Track to *Lower Production Costs*

Let us mail you this booklet. Packed with helpful data. Ask for No. 2008.

This large book is the greatest in its field. Contains a wealth of valuable information. Covers details of 91 outstanding installations. Has 252 large photos, 38 system layouts, 59 other sketches. Write for "Cleveland Tramrail at Work." A nearby representative will deliver it without obligation.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3294 EAST 284th ST. WICKLIFFE, OHIO

Are YOU paying for Overhead Handling *Without having it?*

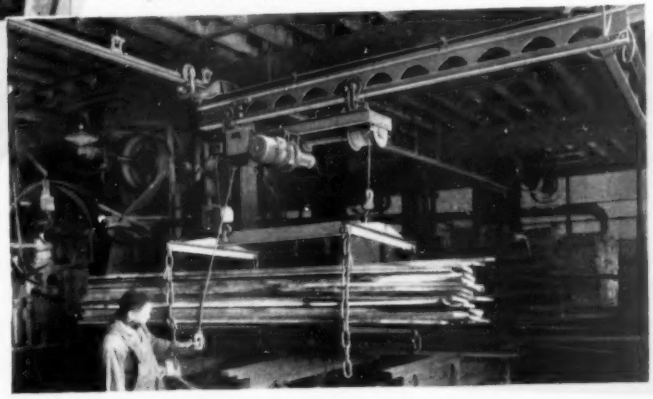


Hundreds of plants are in effect making sizeable payments on materials handling equipment every month without getting it. The payments are the extra costs incurred through inefficient handling losses. Have a Cleveland Tramrail engineer study your plant handling. Make sure you are not dissipating profits on outmoded ways of handling.

Savings Like these Can Be Yours!

Lumber Crane Pays for Itself in 13 Weeks

In just 13 weeks the entire cost of the one-ton hand-propelled crane, illustrated below, with electric hoist, crane runway and erection was absorbed because of the efficiency introduced in handling lumber the overhead way. 10,000 feet are handled per 10-hour day.



Foundry Jumps from 3 Heats to 8 Daily

With no increase in man-power, the installation of an inexpensive Cleveland Tramrail hand-propelled system in a small brass foundry made a terrific difference in its operations. It made possible 8 heats a day where formerly 3 was the average. Despite more than double output, the men are less fatigued now at the end of a day.

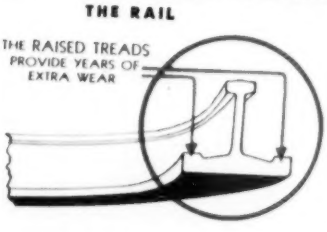
Your CLEVELAND TRAMRAIL *Distributor*

is the Right Man to Know

Cleveland Tramrail distributors are engineering organizations ready to provide counsel on materials handling problems and carry through on all details to erection and operation. Because of their extensive experience you can be sure of getting the best solution to your problem.

There is a nearby Cleveland Tramrail distributor who will be glad to assist you.

ONLY CLEVELAND TRAMRAIL PROVIDES FLEXIBLE SUSPENSION



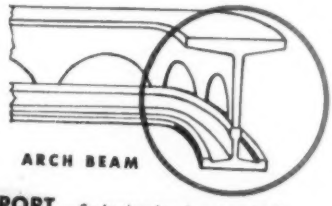
Cleveland Tramrail is the only manufacturer of the full-floating, strain-relieving, flexible-suspension method of track support.

Rail or arch beam is held in position by hanger rods that are attached to the overhead structure. Both ends of the rods have ball and socket connections which provide flexible support and eliminate strains caused by swinging loads.

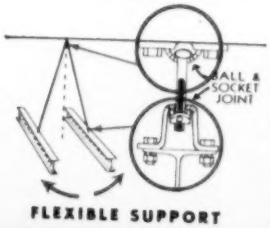
This outstanding feature is a tremendous factor in securing a smooth-running low-maintenance system.

THE RAIL —Tramrail rail is used for loads up to 3 tons where sufficient supports are easily provided.

ARCH BEAM —Seven sizes of arch beam are available for heavier loads or service and where spans between supports are long.



ARCH BEAM



FLEXIBLE SUPPORT

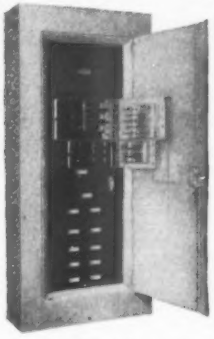
FLEXIBLE SUPPORT —Swinging loads set up high strains in overhead handling systems rigidly secured to the supporting structure and friction is increased and carrier operation retarded by uneven loading of the wheels. This condition is far worse on curves. These disadvantages are eliminated by Cleveland Tramrail flexible ball and socket supports, resulting in unusually smooth, easy operation.

SAVE TIME... LABOR

Get faster deliveries with standardized FA interchangeable

PLUG-IN FEEDER PANELBOARDS

Pulfuzswitch Type of Panelboard with 30 ampere, 2 and 3 pole branches. Box is 19½" wide and 4¾" deep.



Panelboard illustrated is a combination of Pulfuzswitch and Klampswitchfuz branches. Box size is 24" wide and 10" deep.

Branch Circuit capacities are as follows:

- **PULFUZSWITCH** 30, 60 and 100 amperes, 250 volts AC or DC; 30 and 60 amperes, 600 volts AC, 2, 3 and 4 poles.
- **KLAMPSWITCHFUZ** 30 to 600 amperes, 250 volts AC or DC, 2, 3 and 4 poles.
- **SNUFARC** 30 to 200 amperes, 600 volts AC, 2, 3 and 4 poles.
- **SHUTLBRAK** 30 to 1200 amperes, 250 volts AC or DC, and 600 volts AC, 2, 3 and 4 poles.

Here's a panelboard that measures up fully to the modern demand for safe, efficient, economical and dependable power and light distribution.

Built of standardized units and assembled as required for specific application, FA Interchangeable Plug-In Feeder Panelboards not only provide adequate capacity for today's needs, but are so designed that future additions of circuits and changes in capacity can be made a simple matter of adding new units.

Three dependable FA Switches — the Pulfuzswitch, Klampswitchfuz and the Snufarc — make these panelboards the finest in safety and efficiency. All types combine switch and fuse in one unit so that current is "OFF" when the fuse carrier is removed or the door opened. This makes replacement of fuses safe, quick and simple.

Boxes are standardized as to width, height and depth to meet any combination of branches or any job requirement. They are shipped from stock, thus facilitating delivery. Except for smaller sizes, all boxes have removable ends to permit drilling of conduit openings on the job. Smaller boxes have standard knockout layout in ends. Generous wiring space and ease of installation are other features.

For operating switch requirements FA Shutlbrak Type A quick make and quick break interlocking switches are available.

Want to know more about these modern panelboards? Your nearest FA representative, listed in Sweet's, will be glad to provide it.

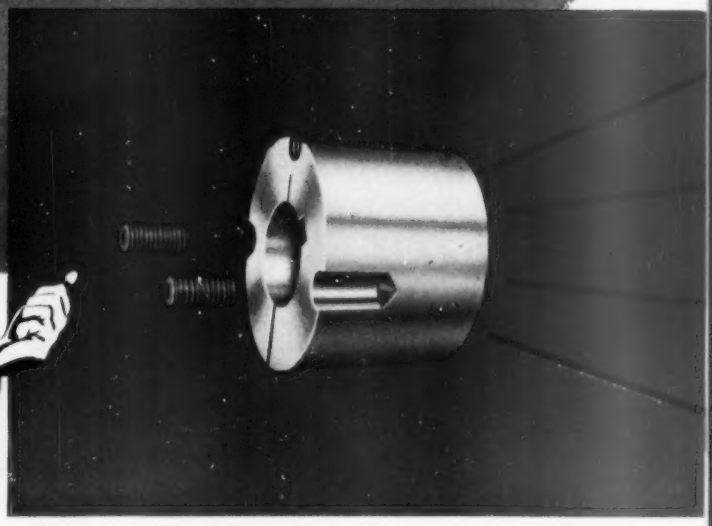
Frank Adam Electric Co.

P. O. BOX 357 ST. LOUIS 3, MISSOURI

Our 62nd Year

Makers of BUSDUCT • PANELBOARDS • SWITCHBOARDS • SERVICE EQUIPMENT • SAFETY SWITCHES • LOAD CENTERS • QUIKHETER

Now-Standardize on TAPER-LOCK



Now, for the first time, you can have all the benefits of standardizing on a truly modern method of mounting wheels on shafts . . . through the famous Dodge patented Taper-Lock design.

The time-saving, cost-cutting performance of Dodge Taper-Lock . . . already proved in millions of installations of Taper-Lock Sheaves, Couplings and Conveyor Pulleys . . . is now available in a complete line of Taper-Lock Sprockets with Dodge Roller Chain.

The bushing pictured here fits into the hub of every one of the Dodge products shown—sprockets, sheaves, couplings, conveyor pulleys. Both tapered bushings and hubs are precision machined to achieve perfect interchangeability. The result is less down-time on machines, simpler maintenance, reduced inventories. Taper-Lock gives you an unmatched opportunity to lower your costs and keep production rolling.

Dodge Taper-Lock grips the shaft for the full length of the bushing—holds with the firmness of a shrunk-on fit, yet comes off easily, quickly.

Taper-Lock's exclusive advantages were never more strikingly proved than in the new line of sprockets recently introduced by Dodge. For Taper-Lock brings to sprockets a new "off-the-shelf" availability. No time-consuming and costly reboring, key seating, drilling and tapping for set screws, needed to fit them to the shaft! Dodge Taper-Lock is available in both driver and driven sprockets from No. 40 to No. 100, up to 112 teeth. Taper-Lock bushings to fit shafts from ½" to 10" are available from stock.

Consider carefully the cost-saving advantages you get by standardizing on Taper-Lock — the modern method of mounting wheels on shafts. For further information, call your Dodge Distributor, or write the factory.

DODGE MANUFACTURING CORPORATION, 400 Union Street, Mishawaka, Indiana

TAPER-LOCK SPROCKETS and Dodge Quality Roller Chain

— THE MODERN WAY TO MOUNT SPROCKETS

TAPER-LOCK SHEAVES

— THE MODERN WAY TO MOUNT SHEAVES

— THE MODERN WAY TO MOUNT COUPLINGS

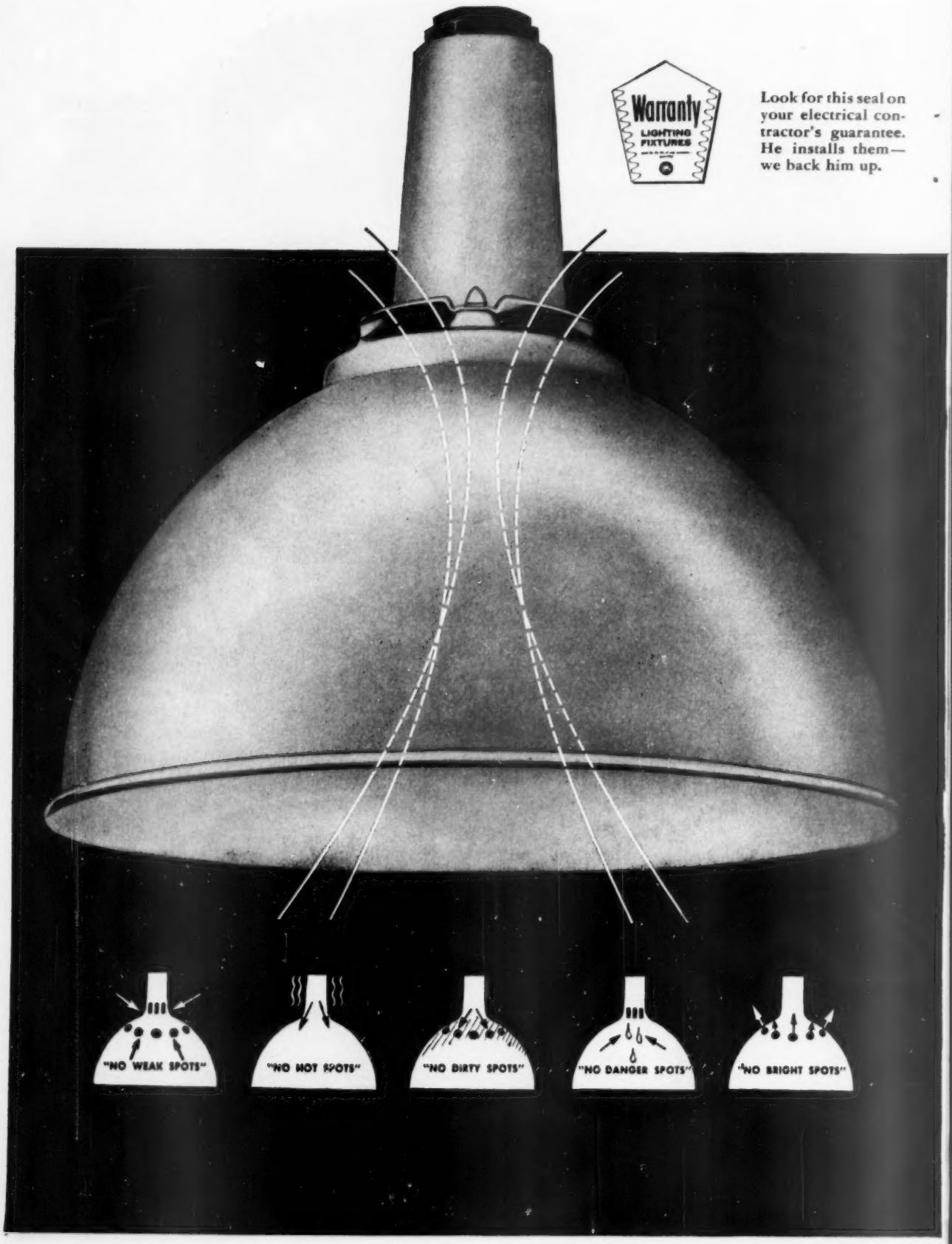
TAPER-LOCK COUPLINGS Rigid and Flexible

— THE MODERN WAY TO MOUNT CONVEYOR PULLEYS

TAPER-LOCK SOLID-STEEL CONVEYOR PULLEYS

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory-trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified phone book.

DODGE


Warranty
LIGHTING FIXTURES
Look for this seal on your electrical contractor's guarantee. He installs them—we back him up.
"NO WEAK SPOTS"
"NO HOT SPOTS"
"NO DIRTY SPOTS"
"NO DANGER SPOTS"
"NO BRIGHT SPOTS"

3 times more light with only 10% increase in kilowatt hours

. . . the combination of mercury lighting plus ventilated high-bay luminaires makes this possible

The Worthington Corporation's Oil City, Pa. plant jumped its illumination from a measured 5-10 footcandles to 25-30 . . . and by using Westinghouse ventilated, high-bay units, maintained this better light longer, and at the same time, cut fixture cleaning costs.

This lighting improvement is only part of an electrical expansion program, *to modernize with light-for-better-work.* 1000-watt incandescent units were replaced by new Westinghouse 1000-watt mercury units. Original branch wiring and conduit from the 230-volt power supply were re-used by employing a 220-volt single-phase a-c power system. Power consumption increased only 10%, but Worthington workers enjoy *three times more light.*

These construction features make sense

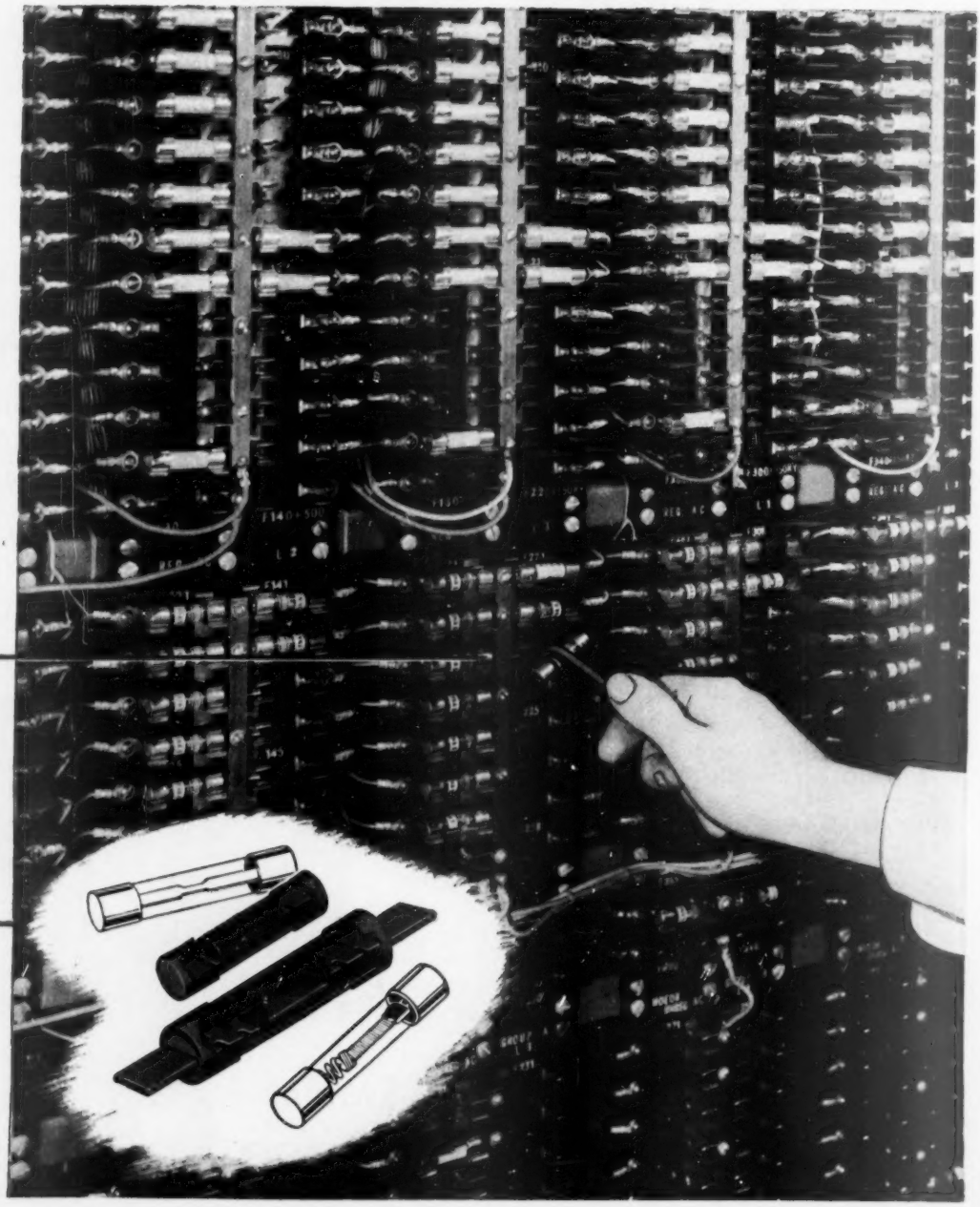
In Westinghouse high-bay luminaires, the opening between the neck and the reflector provides a constant air stream which sweeps clean the entire reflecting surface. There is less manual cleaning needed—lighting efficiency is maintained longer. With fixtures at 48 feet above floor level, this is wholly practical and economical! And Worthington gets these additional features in the Westinghouse high-bay luminaire; longer lasting because reflector and extension neck are two separately spun pieces —*no thin spots. No weak spots* to cause trouble because the ventilating system is neither a part of the extension nor reflector. *No spotty dirtiness* because the ventilator is one large opening.

You, too, can modernize with light for better work

This is only one example of what can be done with *light-for-better-work.* If your problem is high-bay lighting, we can solve it—and other industrial lighting problems as well—with a variety of specially designed luminaires and Westinghouse engineering experience. Why not see your Westinghouse distributor today and get the complete story? Write for B-5664, Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa. J-01338-A

YOU CAN BE SURE...IF IT'S Westinghouse

More Than 400 FUSETRON and BUSS Fuses are used in IBM's Electronic Data Processing Machines



The new IBM electronic data processing machines, made up of eleven units, can multiply or divide more than 2,000 times a second, and add or subtract more than 16,000 times a second.

In these electronic data processing machines, protection of the intricate wiring is of the utmost importance. IBM uses between 400 and 500 FUSETRON and BUSS fuses in each of its new '701' high speed calculators.

On circuits where surge currents might cause an ordinary fuse to blow needlessly, IBM specifies FUSETRON dual-element fuses because of their long time-lag. On other circuits where no surges occur, or where even a short-lived surge might cause damage, single-element BUSS indicating fuses are used for fast opening in case a fault occurs.

When this newest and most powerful high speed electronic calculator was displayed at IBM World Headquarters on March 27th of this year, FUSETRON and BUSS fuses were one of the component parts that made the operation of this spectacular machine possible.

You Can Have The Same BUSS Dependability and Accuracy in Your Plant . . .

FUSETRON dual-element fuses for the protection of industrial and commercial circuits are made with the same precision demanded for this ultra-modern IBM equipment. That's why FUSETRON fuses, used throughout the entire electrical system give you a degree of protection obtained with no other device.

And, don't forget — FUSETRON fuses not only give you protection against short-circuits, they give 10 point protection: 1. Protect against short-circuits. 2. Protect against needless blows caused by harmless overloads. 3. Protect against needless blows caused by excessive heating — lesser resistance results in much cooler operation. 4. Provide thermal protection — for panels and switches against damage from heating due to poor contact. 5. Protect motors against burnout from overloading. 6. Protect motors against burnout due to single phasing. 7. Give double burnout protection to large motors — without extra cost. 8. Make protection of small motors simple and inexpensive. 9. Protect against waste of space and money — permit use of proper size switches and panels. 10. Protect coils, transformers and solenoids against burnout.

FUSETRON
TRUSTWORTHY NAMES IN ELECTRICAL PROTECTION
BUSS

Start Saving With Fusetron Fuses

FOR MORE INFORMATION use this coupon

BUSSMANN MFG. CO.
University at Jefferson, St. Louis 7, Mo.
(Division of McGraw Electric Co.)

Please send me complete facts about FUSETRON dual-element fuses.

Name .....
Title .....
Company .....
Address .....
City ..... State .....

*FUSETRON is a trade mark of the Bussmann Mfg. Co., Division of McGraw Electric Co.

GET *Tough*

. . . insist on increased part life, longer production runs, lower costs

Bottom Folding Drum in a Weber No. 5 SOS Paper Bag Machine. Ampco Metal is used as indicated.

Insert view shows complicated bottom of bag being folded and formed.

H. G. Weber & Co., Inc.
Kiel, Wisconsin

Product: Paper bag machine with capacity up to 300 bags per minute. Shown here is bottom folding drum and cam roller arrangement.

Application of Ampco Metal: Bottom folding drum is equipped throughout with Ampco castings for cam followers, drum fingers, opening cylinder fingers, drum clamps and center gripper finger holders. Cams are subjected to high shock load. Cam followers make cam contact 300 to 500 times per minute. Cam roller pressures . . . 35 to 40 lbs.

Results: Ampco Metal gives substantially longer cam life and reduces manufacturing costs by eliminating heat treating and grinding.

Ampco Metal increases part life by eliminating excessive wear on drum parts caused by abrasiveness of the paper.

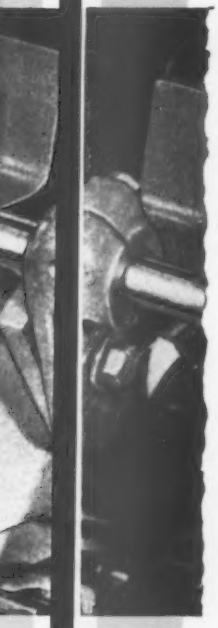
IT'S PRODUCTION-WISE TO AMPCO-IZE!

Cam — Sand-cast.

Valve bodies — Sand-cast.

use AMPCO* METAL

Bushing material—Centrifugally-cast Ampco Grade 18 bars, standard 12½" lengths.



Today's production schedules are demanding. They call for machines that are tough — machines that can take it hour after hour, day after day, month after month.

Designers and plant operating men are using Ampco Metal to build this extra toughness, longer life into their products and equipment.

Here's why: Ampco Metal has high compressive strength — doesn't squash out. It resists abrasion, corrosion and erosion. These properties plus high impact, high fatigue values and excellent bearing qualities make Ampco Metal ideally suited for the toughest kind of service.

You can get Ampco Metal in a variety of forms —sand and centrifugal castings, bars, forgings, sheet, plate, tubes, arc welding electrodes and wire, etc.

Enjoy higher production, freedom from trouble in both product and plant — use Ampco Metal. Your nearest Ampco field engineer is glad to help you on any application. Consult him or write us for additional information.

*Reg. U. S. Pat. Off., Ampco Metal, Inc.

Clutch ring — Centrifugally-cast.

Tear out this coupon and mail today!

Ampco Metal, Inc.

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Company.....

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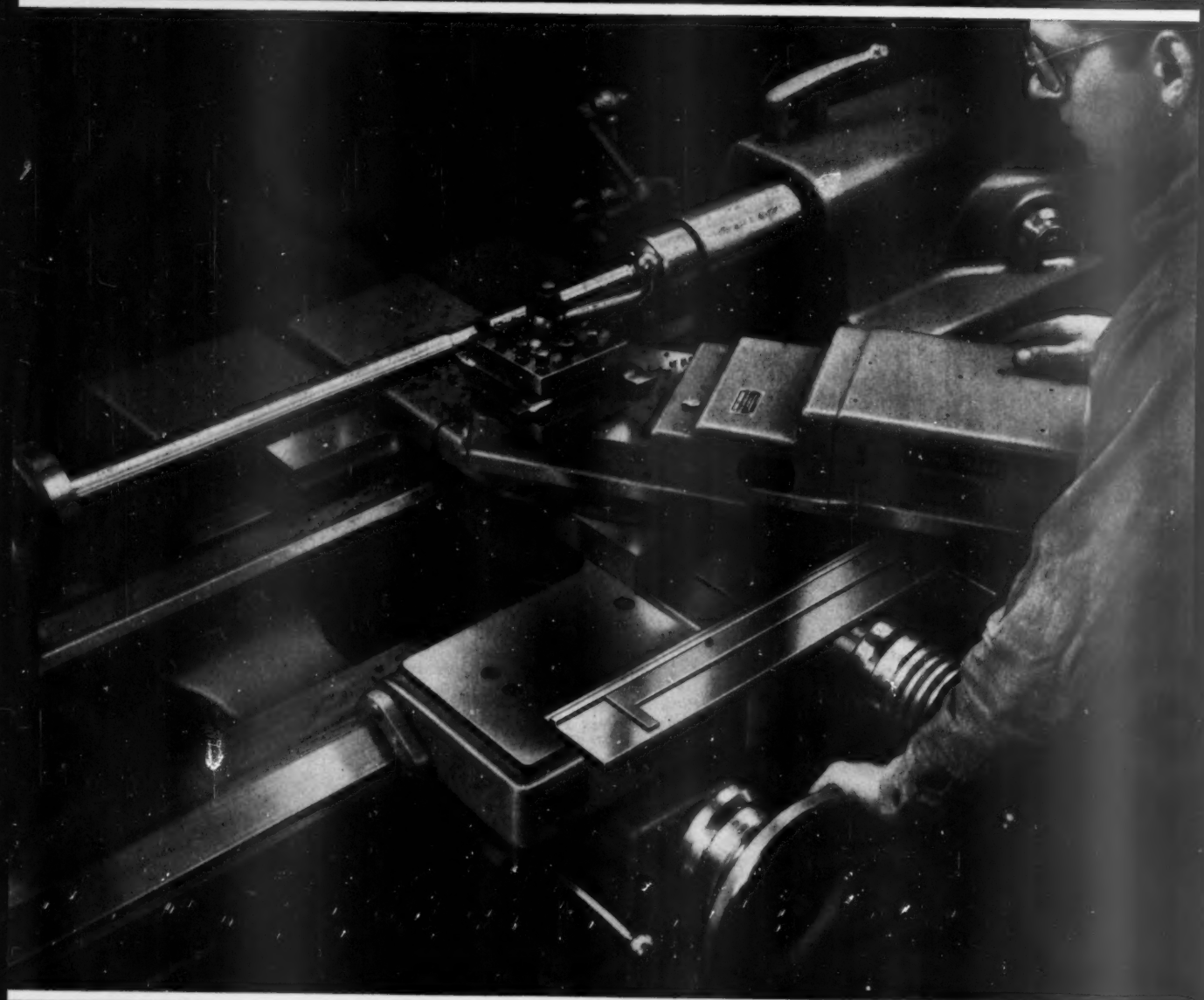
B-10

NOW SCULLY-JONES TURNS

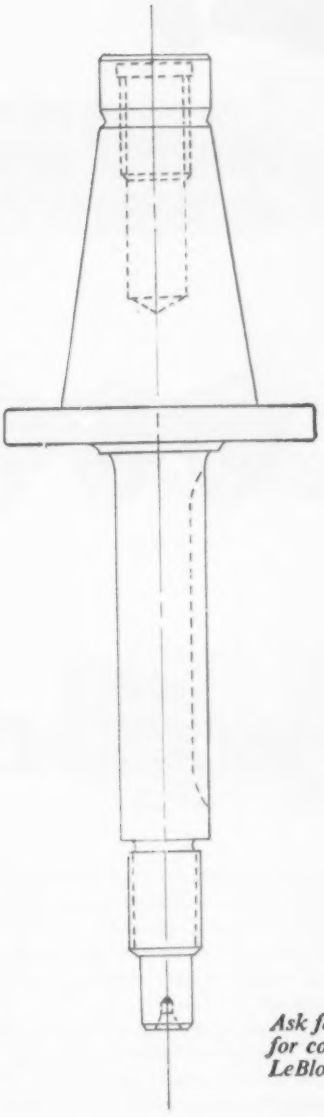
four arbors instead of 3...



Hydra-Trace (Trade Mark, Registered U.S. Pat. Off.) is LeBlond's heavy-duty hydraulic tracing attachment can be mounted in place of the compound rest on practically all LeBlond Lathes built since 1935

same time, same lathe...

plus "Hydra-trace"*



When defense needs mushroomed demand for production equipment, Scully-Jones & Co. of Chicago found itself jammed with orders for milling machine arbors (they make more arbors than anyone else). Acting on advice from engineers at LeBlond's Chicago Office, Scully-Jones added Hydra-Trace to their LeBlond 16" RT Engine Lathe. Now they turn out four arbors in the time formerly needed to produce three—same lathe, plus Hydra-Trace.

Besides boosting output, this template-controlled hydraulic tracer saves 45% on set-up time, gives uniform precision without the need of a highly-skilled operator.

Stepless form-turning, contour facing, and turning step shafts are all in a day's work for Hydra-Trace. *Fits all LeBlond Engine Lathes built since 1935*, can be mounted easily in a matter of minutes. Templates are flat, compact, suitable for both rough and finish turning. They can be produced readily in your own plant, stored in limited space.

When turning requirements call for increased output—with present machines or with new equipment—you'll find just what you need in LeBlond's complete line of lathes and lathe attachments.

Call your nearby LeBlond Distributor or write—

Ask for Bulletin HT2H for complete details on LeBlond Hydra-Trace.

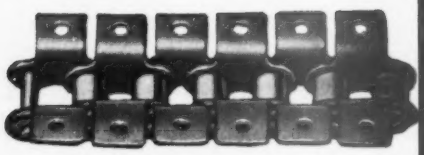
turned faster by

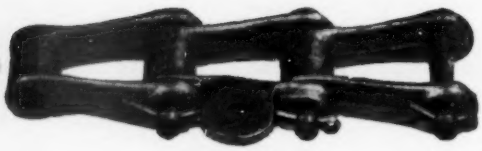
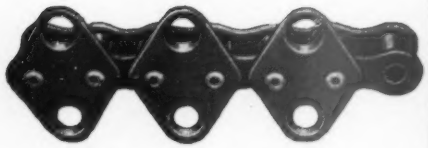
LeBLOND of Cincinnati

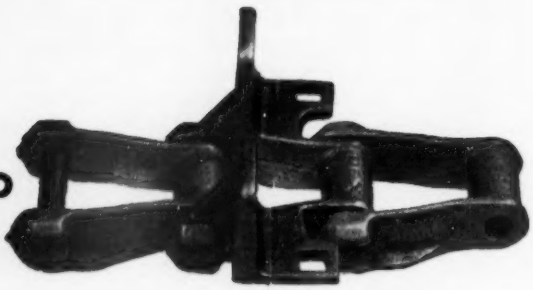
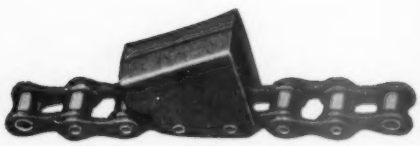
THE R. K. LEBLOND MACHINE TOOL COMPANY, CINCINNATI 8, OHIO

WORLD'S LARGEST BUILDER OF A COMPLETE LINE OF LATHES • *FOR MORE THAN 65 YEARS*

HELP

help ...help 

help  ...help 

help  ...help 

Here's plenty of "HELP" for you if your handling problem involves the movement of material to, through, and away from a machine. CHAIN and ATTACHMENTS are the biggest "HELP" you can find.

In the complete CHAIN BELT COMPANY line of more than 2000 sizes and types of chain . . . *and every type has a number of attachments* . . . you'll find exactly what you need for most efficient product movement . . . lowest overall operating costs. And, because the line *is* complete, you can choose the chain that will reduce costs—improve performance—insure trouble-free operation.

If exact, split-second timing is your problem, Baldwin Rex® precision finished roller chain is your answer. If low initial cost is important, Rex® Cast Chain will meet this requirement. If heavy loads at slower speeds are your problem, a Rex Chabelco®

REX

BALDWIN REX®

Chain

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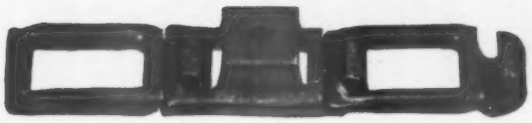
KANSAS CITY • LOS ANGELES • LOUISVILLE

Distributors in all principal cities



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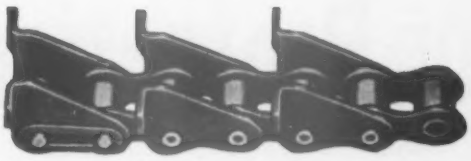

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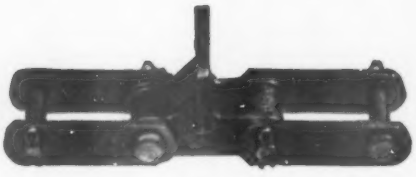

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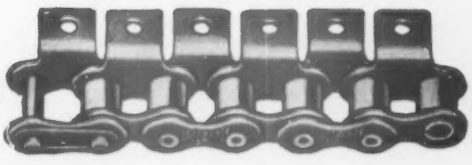

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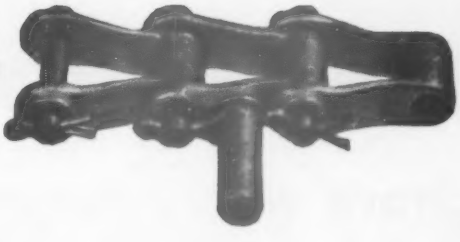

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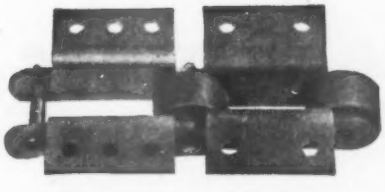

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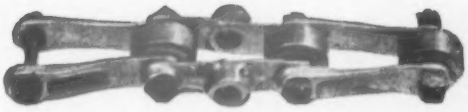

Steel Chain is the ideal solution. These and the many other types of chains can all be furnished with a wide range of attachments.

To be sure of obtaining the *exact* chain and attachment that will be *exactly* right for your needs, why not have your Chain Belt Field Sales Engineer help you? His specialized knowledge can prove extremely valuable to you in planning for lower cost, improved performance from the equipment in your plant. Or for helpful information, mail the coupon below.

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Please send me a copy of Bulletin 50-35 on "Chains and Attachments for Low-Cost Conveying."

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Company.....*Dept*.....

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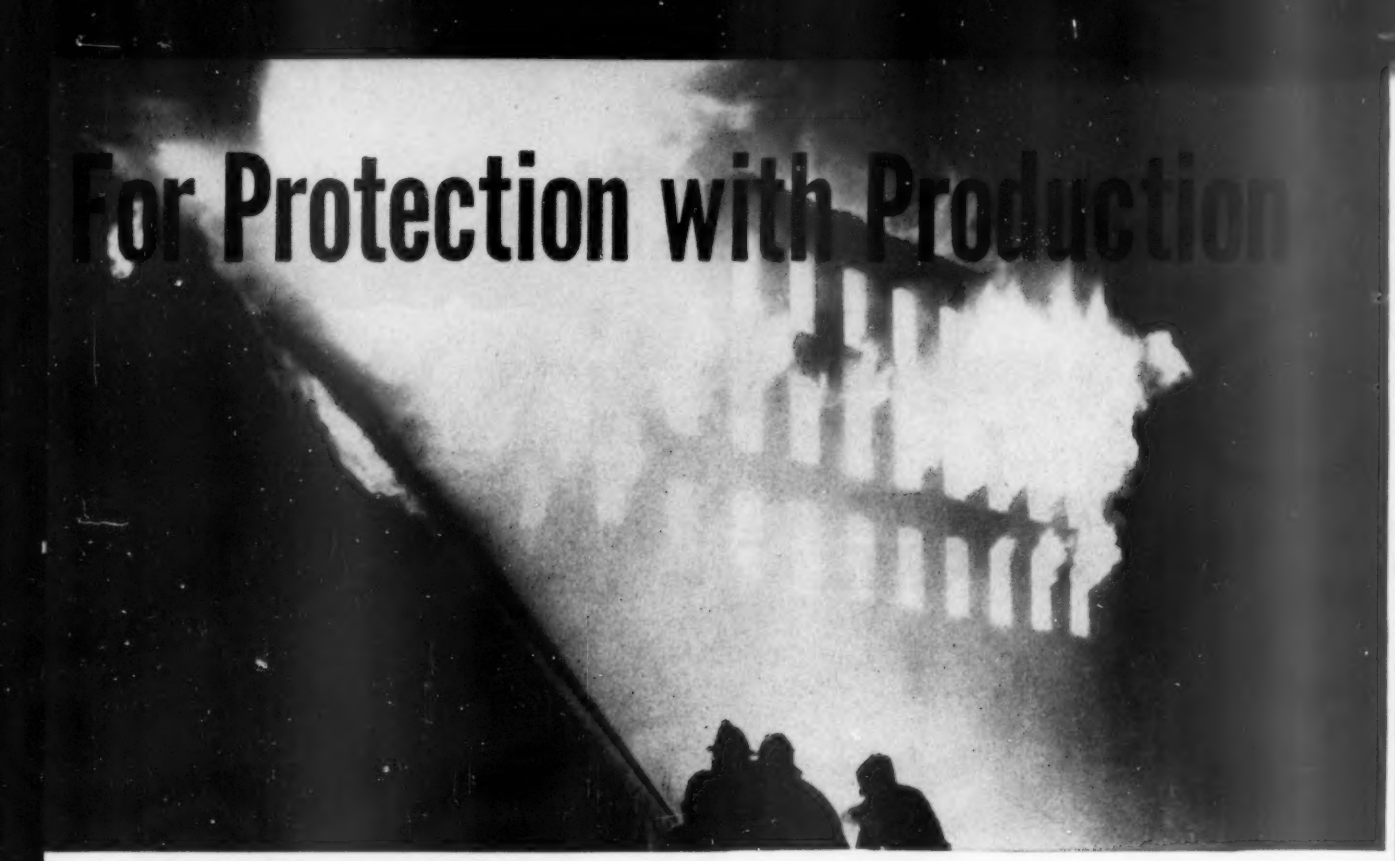

Store with safety with PROTECTOSEAL

APPROVED

VENTS AND FITTINGS

1 **NEW SELF-POSITIONING SELF-CLOSING AUTOMATIC FAUCET** with Flame Arrester, the perfected result of years of experiment, testing and design. Perforated brass flame arrester is placed within the body at the outlet where it provides best protection and is easily removed for cleaning and inspection without disconnecting. Valve is outside of body where valve seat is not distorted by excessive pressure Furnished standard with Buna N, Neoprene or Thiokol gaskets; other materials available upon request

2 **DRUM BUNG FITTING,** a combination fill and vent inserted into the bung opening of the drum which provides vacuum and automatic pressure relief to guard against explosion of drum under fire conditions. Double perforated metal fire baffle extends into drum to permit re-filling without danger of interior fire. A safety protection in the storage of flammables in sealed drums, especially when located in plant store rooms.

3 **FILL AND VENT FITTING,** a combination fitting which permits rodding and sampling of either underground or above ground storage tanks. Double concentric cylinders extending from top of fill pipe to the bottom of tank help guard against fire and explosion when filling and rodding. Pressure relief valve in top closes by gravity and rises to full height under extreme conditions. Vacuum relief valve rises to admit air as tank contents are pumped out or to compensate for cooling. Weather cap provides full protection to valves. Cover may be padlocked.

Other Protectoseal Safety Storage Products include Conservation Vents and Flame Arresters, Plate Type Non-Condensing Vents, Storage Tank Seals and Tank Car Fittings. Request special Vent and Fitting Catalog.

APPROVED *by Underwriter's Laboratories*

in the Use of Flammable Liquids

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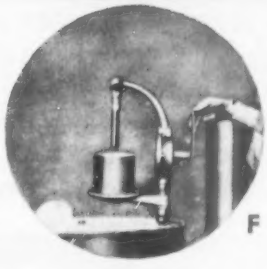
APPROVED SAFETY PRODUCTS

Protect against fire and explosion
Seal against loss by evaporation
Prevent waste in handling
Speed production



A SAFETY CANS—Double concentric fire baffle located inside base of spout. Spring loaded cap is mounted on ball and socket joint and automatically makes tight, even closure upon release. Seam welded container is air pressure tested. Squeeze grip handle for controlled pouring.

B SUPPLY CANS—Double perforated-metal fire baffles at filling closure and base of flexible pouring spout. Valve also at base of flexible spout is conveniently operated by carrying handle to give positive control when pouring. Sturdy seam welded container factory tested before shipment.

C BENCH CANS—Spring mounted perforated dasher is a fire baffle. If ignited, liquid on dasher burns out but liquid in can is safe from ignition. Occupies small space; ideal for cleaning small parts.

D PLUNGER CANS—Slight pressure depresses dasher and liquid is drawn momentarily into dasher cup for transfer to swab or sponge. Excess liquid automatically drains back into can. Fire baffle in dasher prevents ignition of contents. Operates with one hand and is ideal for cleaning parts on production line.

E OILY WASTE CANS—Tight, seam welded body with snug fitting cover which closes automatically to smother fire. Cover opens wide with slight foot pressure on full-width treadle and provides large opening for placing or removing rags. Ventilated bottom; smooth sides inside and out; balanced base guards against accidental tipping.

F TRANSFER PUMP—Provides complete protection against explosion and fire hazards in transfer of hazardous liquids. Three flame arresters are built into pump at spout, above bung adapter and at strainer inlet within drum. Protected openings provide for vent and pressure relief. Pump requires no priming, is light in weight and made of special aluminum alloy to resist corrosion.

Whatever your requirements may be in the safe handling of flammable liquids in storage and in use, Protectoseal has a specialized approved product which guards against fire and explosion, and protects life and property. Secure complete information on this extensive line of safety products today. Fill in coupon or attach to company letterhead.

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1962 South Western Avenue, Chicago 8 • *In Canada:* Safety Supply Co., Toronto

The Protectoseal Company
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Send catalogs giving complete description, specifications or sizes and prices on your complete line of Safety Equipment for all phases of storing, handling, dispensing and using flammable liquids.

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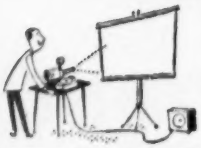
Double Feature

from SKF

Here's SKF's "Double Feature" to help you *keep* the anti-friction bearings in your production equipment running at top efficiency . . .

FEATURE No. 1

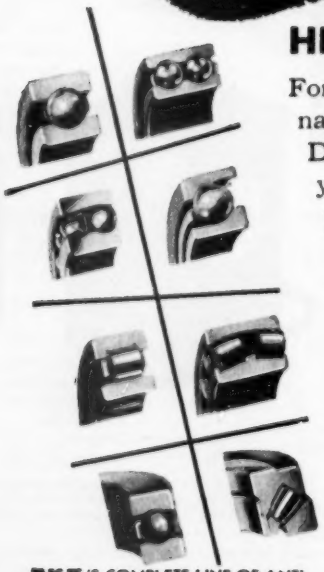


Educational Slide Films—two of them—one covering "Bearing Parts and Nomenclature," the second showing you the essentials of "Caring For Bearings."

These full color, twenty-minute sound slide films were produced with just one idea in mind—to show everyone concerned with plant maintenance how to avoid unnecessary bearing failures. (Most of them are unnecessary.)

FEATURE No. 2

A coast-to-coast network of *trained* SKF Distributors who are qualified specialists in bearing replacement, and who can deliver what you need from stock on short notice.



SKF'S COMPLETE LINE OF ANTI-FRICTION BEARINGS, PLUS SKF'S COAST-TO-COAST DISTRIBUTOR NETWORK, HELPS YOU *PUT THE RIGHT BEARING IN THE RIGHT PLACE.*

HERE'S HOW TO BENEFIT . . .

For SKF Feature No. 1, arrange to have your maintenance men see the two SKF Sound Slide Films. Any SKF District Office or Distributor will arrange a showing at your convenience.

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BALL AND ROLLER BEARINGS

ANACONDA FORUM
for the Electrical Industry

MODERNIZATION AND ELECTRIFICATION— A LOOK AHEAD

by: Maxwell Cole
Manager Market Studies and Service Division
Philadelphia Electric Company
Philadelphia, Pa.

AMERICAN industry, its vision of new products for better living, its ingenuity in developing new methods and materials to make them, and its courage to invest in the facilities to produce them is the cornerstone on which American living standards have been erected. To make more things, faster, better and cheaper so that they may be available to more and more people has been the goal of American industry. Its success in reaching toward that goal has been its outstanding accomplishment.

REPLACING MANPOWER WITH HORSEPOWER

Operating in a free competitive economy, at liberty to develop new products and better ways of making them, American industry has taken full advantage of the opportunities offered by modern, high speed tools powered by electricity to increase its productive capacity, to improve its product and to reduce costs by replacing manpower with horsepower. Refrigerators and washing machines, automobiles and jet-propelled planes, plastics and stainless steel and many other of today's conveniences, even necessities, would not be available in sufficient quantity or at low enough prices to have become accepted elements of American life but for the readiness of industry to accept new products and new methods and to modernize their facilities to accommodate them. Industry's readiness to streamline production methods and modernize facilities enabled us to snow our enemies of World War II under an avalanche of production.

NEW CHALLENGES

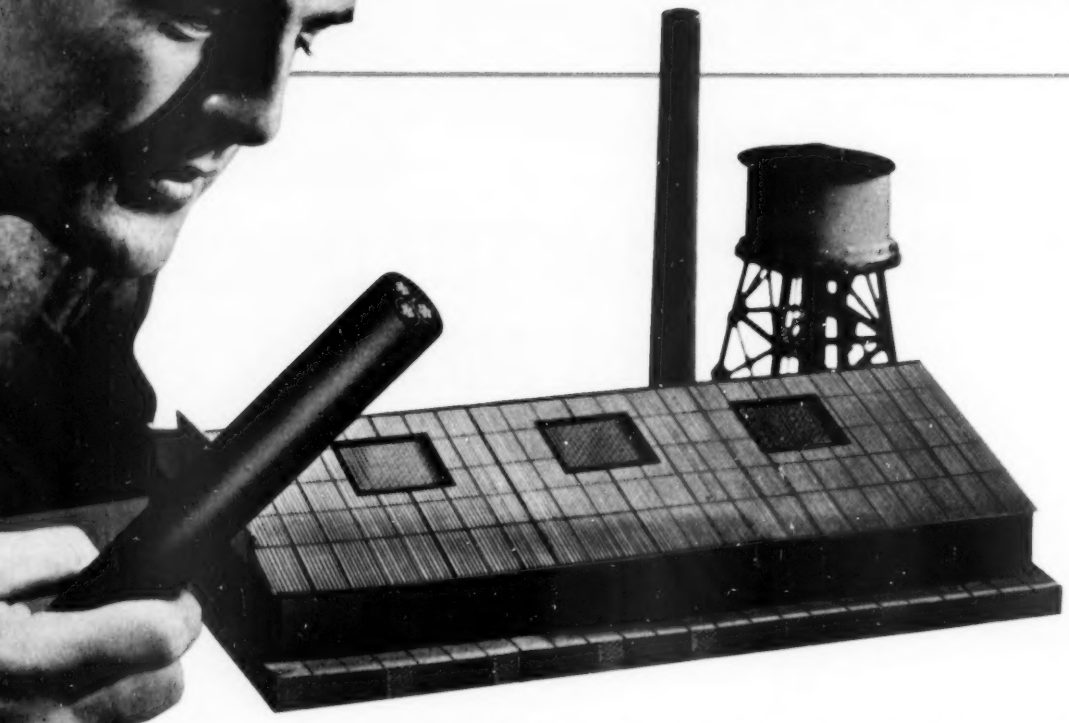
Today, industry faces new challenges. It must produce materials of war in such quantity and of such quality that no enemy dare attack us; it must maintain progress in fields of civilian production; and many people believe we are entering an era of keener competition than experienced for many years. Industry's ability to meet these challenges depends on its willingness to continue to modernize facilities and keep abreast of progress.

CONTINUED MODERNIZATION LIES AHEAD

We stand only on the threshold of the promises science and industry hold out for our future strides into security and better living. These promises will become realities only as better, more powerful tools are developed for producing them and as industry maintains its courage in investing in them to continue our national progress and replace wasteful or obsolete methods. Contemplating such a vista of promises, with faith that American industry still possesses characteristics which raised it to its present level of greatness, one foresees continued modernization of American factories, processes and products at a pace even greater than it has been in the past.

AMERICA'S CHALLENGE to industry is to meet and sustain an increasingly higher level of production in the face of keen competition. New and better equipment—such as this installation of a 75,000-pound chain drawbench in a Connecticut Mill—is a vital part of expansion and modernization. With each new machine comes the need for increased power and modern wire and cable!

A LOOK AT MODERN



It was great sport but . . .

EVER SEE A STUTZ "BEARCAT" on the road these days? With loving care and a knack for tinkering, hobbyists still keep a few going. They are good cars . . . but hardly economical modern transportation. Now consider how much antique wiring lies around still doing a job . . . of sorts. Hardly efficient. Pathetically unprofitable when pitted against modern power needs. What are we going to do about it? The following article gives some good reasons for re-evaluating our requirements for reserve capacity and replacing obsolete wiring . . . with new and better products.

ONCE MORE it's a case of growing pains! Today industry has already used up its power reserves—though these were considered adequate ten years ago. Now it's time for another upward revision of our ideas of what is a sufficient power margin for operating the new production tools that have been put in our hands. To power them, utilities are now in the process of re-doubling their load capacity. Our stepped-up rate of production and consumption has telescoped the future . . . even beyond the soberly considered estimates of industry leaders as recently as a decade ago!

The link between tool and power source is wiring. New tasks suggest new techniques . . . new tools . . . new power loads . . . new wiring to carry the load. Yesterday's wiring may bottleneck today's production flow.

Some existing plants haven't spotlighted their wiring in many a year. Now—with new production factors in the picture—it is time for a basic survey of wiring. If it's obsolete, replace it . . . and reap the benefits of more efficient power, greater reliability, and long-range economy.

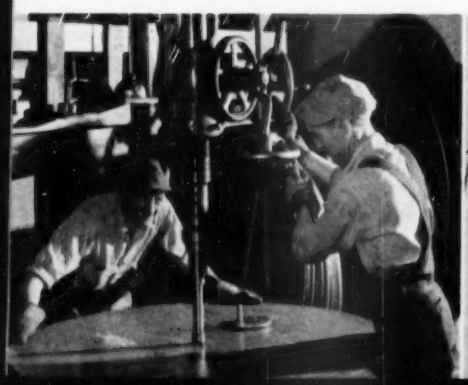
Modern wiring has seen a wealth of new developments—especially in insulation. Let's take a quick look at what's been done. It's all interesting, practical and valuable.

RUBBER INSULATION

Modern wiring may be defined as that approved and accepted since World War II. Twenty years ago we spoke of "enormous strides" in such things as rubber compounding. These resulted in superior products. We

ANACONDA was the first manufacturer of wire and cable to use synthetic resin compounds for insulation. One example is DENSHEATH*—a high-grade and super-aging thermoplastic (vinyl resin). This is widely used today for wiring on (1) machine tools, (2) appliances, and (3) various types of signal systems—as well as for control or switchboard, building or general purpose wiring.

*Reg. U.S. Pat. Off.



DEVELOPMENTS IN WIRING INSULATION

ARE WE ASKING OBSOLETE WIRING TO DO TODAY'S NEW JOBS?

can still speak of "progress." There has been lots of it. They are still striding forward—the chemists, metallurgists, cable engineers and their co-workers. The end is not in sight.

Heat is the great enemy of electrical insulation. But today Code Rubber, Type R, does a much better job in withstanding heat than a few years ago. TABLE I shows how this and other rubber compounds compare.

KIND OF INSULATION	MAXIMUM ALLOWABLE CONDUCTOR TEMPERATURE		
	1940	1947	1953
	degrees C		
Code, Type R	50	60	60
Type RW	50	60	60
Type RH	75	75	75
Type RH-RW	—	—	75,60**
Heat- and moisture-resistant	60,70,75	75,80	75,80
Ozone-resistant* (ASTM oil base)	70	70,75	70,75
Ozone-resistant* (butyl)	70,75	75,80	80,85

*Temperature varies with manufacturer
**whether in dry or moist location

TABLE I

Type RH-RW is outstanding. This is being used so much now—at little more cost than Type R—that the latter has a narrower market than even just after the war. Ozone-resistant, butyl-base compound is another excellent performer. Its stability, long aging, low power factor and other desirable physical and electrical properties under severe operating conditions make it a dependable compound for voltages up to 15 kv and sometimes higher. Several manufacturers supply it.

During World War II natural rubber was out. Synthetic (G-RS) rubber took its place. In just a few years, cable manufacturers found many things in its favor . . . so many, in fact, that the natural product is disappearing as a wire and cable insulation. "Cold" rubber is another development. Coming fast into regular use, it brings improved physical and electrical properties to low-voltage cables.

B-r-r-r . . . now I'm cold!

Another forward stride is the pre-war development and post-war application, in great quantity, of neoprene jacketing for rubber-insulated cable. Dependable under many severe conditions, relatively inexpensive, it is excellent in moist or dry conduit, direct burial, in aerial and other locations.

THERMOPLASTIC INSULATION

You can do a modern wiring job today with materials barely existing or unknown as late as just before World War II. These are the thermoplastics. Two stand out as basic insulations: polyvinyl chloride (vinyl resin and one or more of its co-polymers, which appear under various trade names) and polyethylene.

Polyethylene is a remarkable insulation for many purposes. It made radar possible. Now, however, the real workhorse of the industry is the first—PVC for short.

Millions of feet of PVC are used annually for wiring houses, stores, office buildings, by the armed forces and in many industrial applications. It resists many enemies of insulation: oil, moisture, acids, alkalies, abrasion, greases, and gasoline. With just normal treatment, it has a long life.

There are many other thermoplastics; the list has grown long in just a few years. But only a few others are used for insulations. Among them are Rulan, Nylon, Cardolite, Saran, Tenite II, Styraloy, and Teflon.

Polyethylene has a very high dielectric strength, low power factor and low moisture absorption when compared to vinyl resin. The latter has lower dielectric strength, high dielectric loss, and satisfactory moisture resistance. Vinyl resin resists ozone. Polyethylene is immune to it. This indicates why polyethylene can be used for high-voltage and high-frequency circuits while vinyl resin, which is cheaper, does very well on low voltages. Both have a weakness. They become plastic at comparatively low temperatures. High overloads on these types of conductors must be guarded against. TABLE II lists some comparative values.

Kind of Insulation	Code Type	Application	Maximum Allowable Conductor Temperature and Location (degrees C)
vinyl resin	T	general purpose	60 dry locations
vinyl resin	TW	general purpose	60 moist locations
vinyl resin	—	machine tool control and switchboard	60 in oil 80 in air
vinyl resin	—	appliance wiring	80,90, or 105 in air only*
Polyethylene	—	general purpose	80 usually special

*depending on compound used

TABLE II

"Thermoplastics help me reduce."

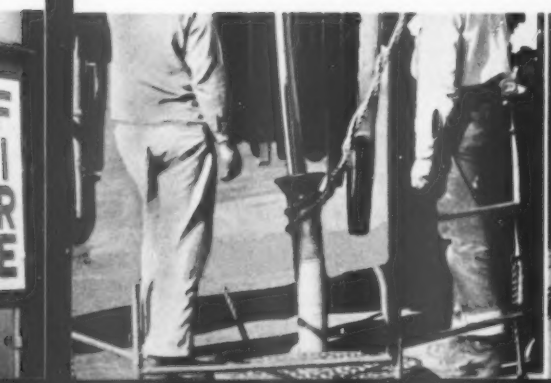
Logically thermoplastics replace rubber insulations for some applications—but not for all. In building wire one outstanding property of thermoplastics is toughness. They require no protective braid. Hence, wire so insulated takes less space.

* * *

This article provides only a brief sketch of a fascinating field. Lower operating costs from more efficient power distribution influence plant profits. In the light of developments discussed here, many readers may want to re-evaluate their own wiring. It's a timely undertaking. We suggest that for more details you write to, or consult with, individual manufacturers.

DURASHEATH* neoprene-jacketed cable has ANACONDA Type ANW (cold-rubber) or Type AB (ozone and heat-resistant butyl) insulation, depending on voltage rating. Used for (1) distribution networks and where wet ducts may contain acid or alkali waters, (2) industrial power distribution overhead, in direct burial, or conduit, (3) circuits in conduit—and many other applications.

*Reg. U.S. Pat. Off.



If you want to cut equipment-relocation costs . . .

WIRE MACHINES TO MAKE THEM MOVABLE

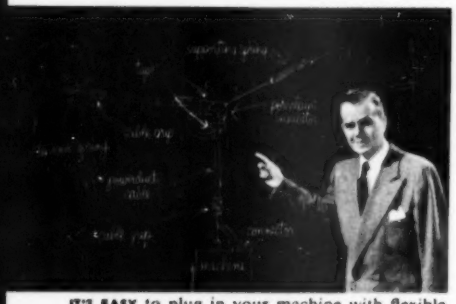
Basic industry strategy calls for more productive machine power. Look into plants like those of the automobile makers. There large banks of automatic machines are lined up in close array. They turn out parts. One bank may occupy only a small part of the long, huge floor area required.

MACHINES SOMETIMES MOVED

Each machine needs a cable. Offhand it seems easy to get cable to machine. But actually some ingenuity is needed to avoid excessive installation costs. The situation is aggravated by the chance that next year —or next month—all machines must be moved in accordance with model changes or plant efficiency.

BUS AND BUSDROP CABLE

You can solve the whole problem very neatly. First install a busduct system on ceiling or under roof trusses. Then connect each machine to it with a flexible cable carrying power and grounding conductors. This cable is called "busdrop cable."

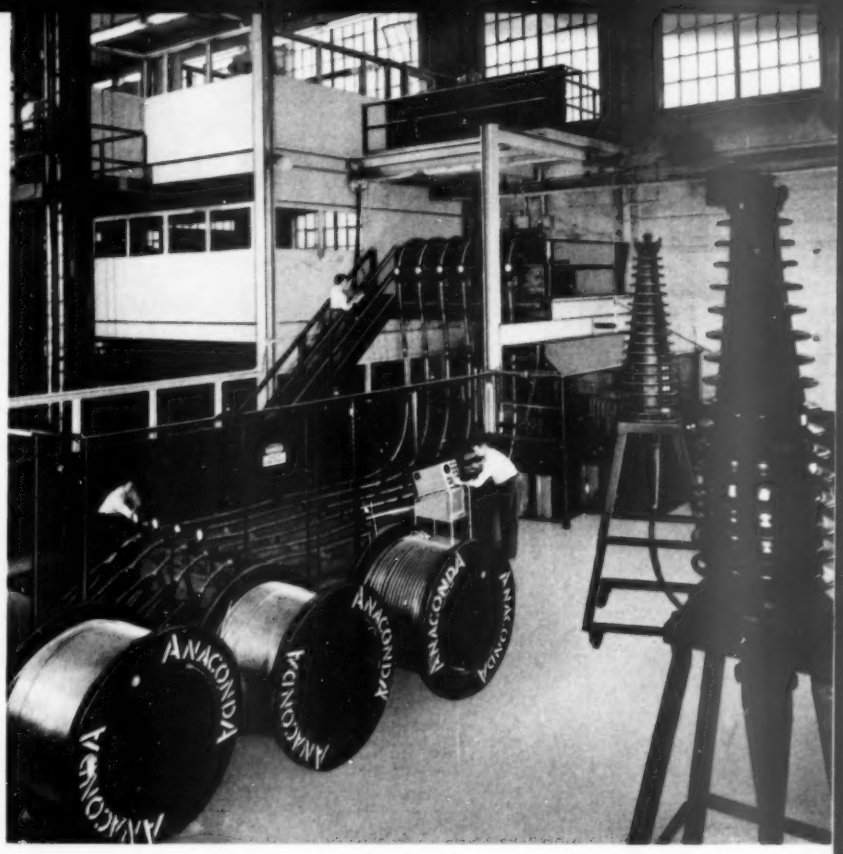


IT'S EASY to plug in your machine with flexible busdrop cable. There's no rigid conduit to rip out later.

TAILOR-MADE SYSTEM

Busduct Power Distribution Systems are widely used. They may be bought tailored to any plant's needs. They are economical; cable can be disconnected and reused elsewhere. This is done often. It means real flexibility, saves time and maintenance costs. It helps industry to keep up its high pace of production.

To do its job right, to last long and to stay neat, busdrop cable must be able to take heavy mechanical abuse and must handle easily. It must be impervious to oils, acids, water, greases, and cutting compounds. And, of course, it's always wise to look for approval from Underwriters' Laboratories, Inc. 53384



LAB THAT HURRIES TIME

. . . CUTS YEARS TO MONTHS IN TESTS TO GIVE YOU LONGER-LASTING CABLES

In this Cyclic-Aging Laboratory at Hastings-on-Hudson, N. Y., high-voltage insulated cables race through the calendar. Once the valuable data which cable-aging made available to electrical engineers took decades to accumulate in actual service—often 20 to 50 years. But here a lifetime of experience is gained in a few years. Rigorous 24-hour test cycles simulate actual conditions . . . but are much more severe. Anaconda Engineers get vital data on cable life, stability and other characteristics needed to evaluate cable design.

This is typical of Anaconda planning—geared to the future. It is only a part, however, of a company-wide program of expansion and improvement now nearing completion in mills and mines. Net result: better cables, available in larger quantities, that last longer and give you *true* economy in use *when you specify* ANACONDA.

FOR FURTHER INFORMATION about any product mentioned in the pages of this advertisement, see your Anaconda Representative . . . or write to *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

ANACONDA®

TODAY'S HEADQUARTERS FOR WIRE AND CABLE

MAKERS OF building, barn, machine tool, control and communication wire • service and overhead distribution cables, bare and weatherproof including ACSR • portable cords and cables • power and busdrop cables • mine, bridge, aerial, underground, duct, network and submarine cables • parkway, airport and street-lighting cables • station, apparatus and vertical-riser cables • magnet wire • copper, aluminum and copperweld conductors • wire and cable accessories.

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Tests by independent laboratories and industrial plants show gas consumption of about ½ gal. per hour — less than 60% as much as for conventional gas trucks. Economy results from low operating speed of engine, exclusive Baker variable voltage generator and efficient Baker drive motor.

40% lower maintenance...

No clutch or gear-shift, eliminating most common cause of gas truck breakdowns. Dependable electric drive and many new design features mean 40% lower repair costs and 40% less down time.

50% longer life...

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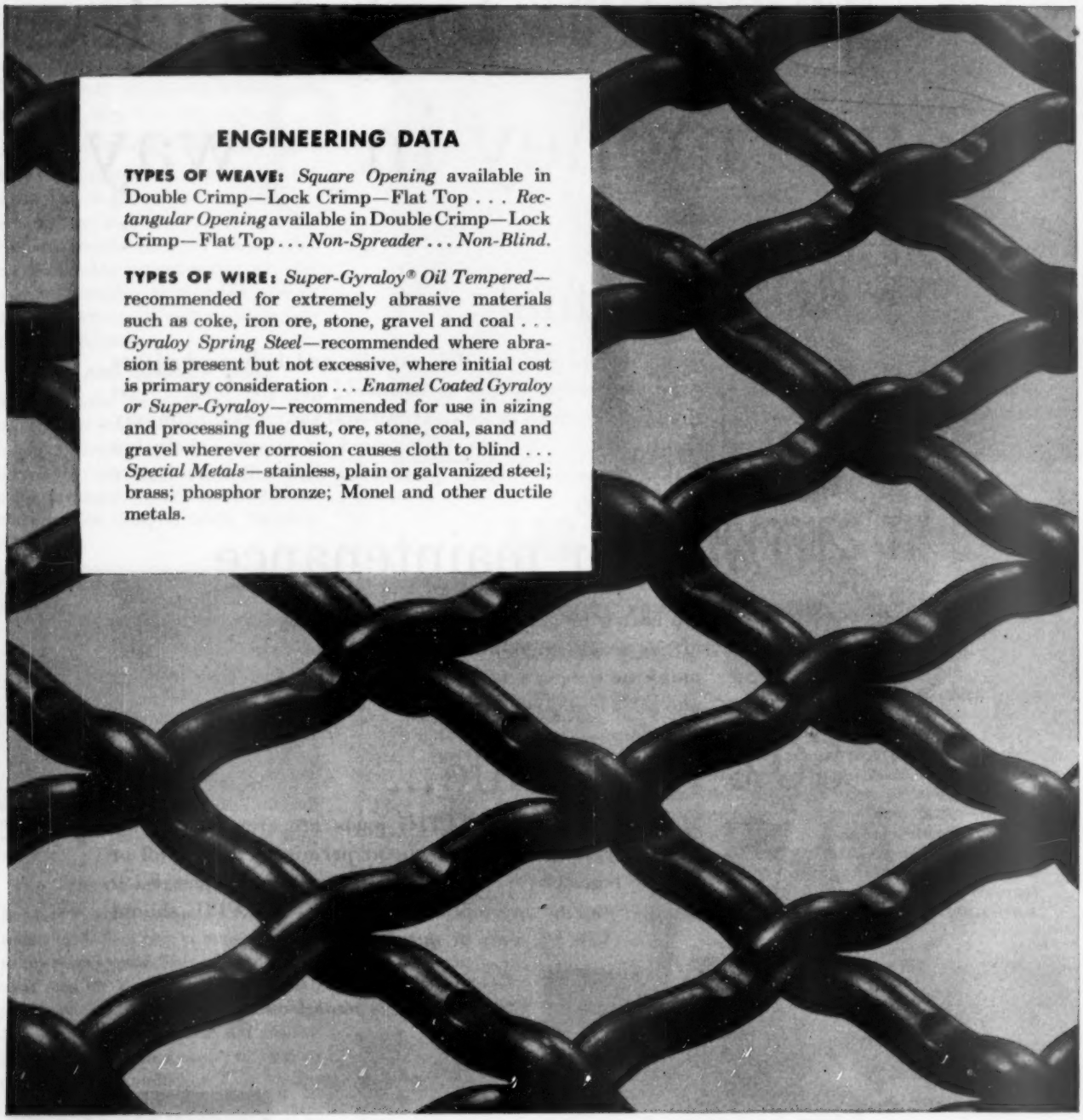

ENGINEERING DATA

TYPES OF WEAVE: *Square Opening* available in Double Crimp—Lock Crimp—Flat Top . . . *Rectangular Opening* available in Double Crimp—Lock Crimp—Flat Top . . . *Non-Spreader* . . . *Non-Blind.*

TYPES OF WIRE: *Super-Gyraloy® Oil Tempered*—recommended for extremely abrasive materials such as coke, iron ore, stone, gravel and coal . . . *Gyraloy Spring Steel*—recommended where abrasion is present but not excessive, where initial cost is primary consideration . . . *Enamel Coated Gyraloy or Super-Gyraloy*—recommended for use in sizing and processing flue dust, ore, stone, coal, sand and gravel wherever corrosion causes cloth to blind . . . *Special Metals*—stainless, plain or galvanized steel; brass; phosphor bronze; Monel and other ductile metals.

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EXECUTIVE OFFICES, STAMFORD, CONNECTICUT

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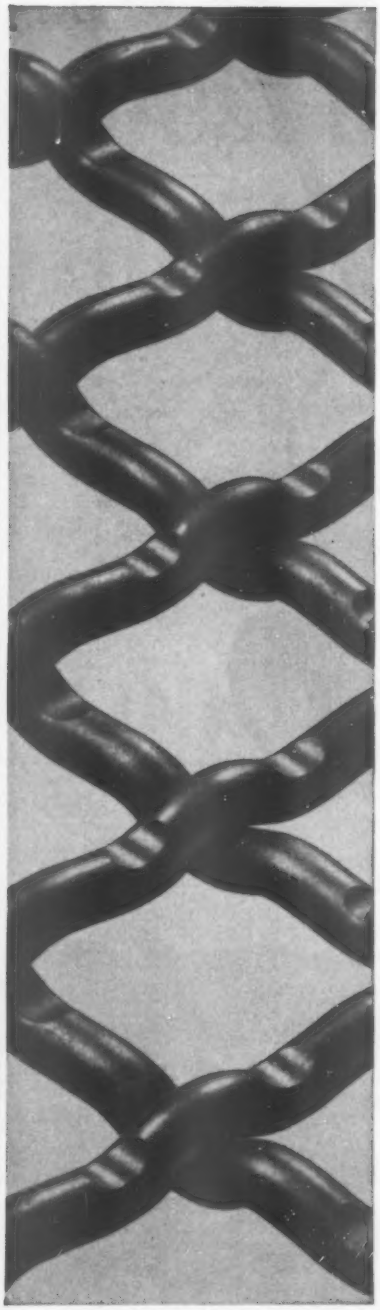

Increased Production Capacity Assures Faster Delivery For All Types Of Hewitt-Robins Screen Cloth

Now, we can give you faster delivery—*direct from our own modern plant*—of the finest quality screen cloth to meet your every need . . . Screen Cloth that gives you longer life, greater satisfaction on any type of screen, regardless of make . . . Screen Cloth that will provide you with highest efficiency, lowest cost per ton.

For shorter delivery on any type of Hewitt-Robins screen cloth send us this information:

1. Type of screen—Name of manufacturer—Model of machine.

2. Kind of screen cloth desired: Specify type *weave*—type of *wire*.

3. Size of clear opening or mesh and wire diameter.

4. Type of edge formation: Flat edges — Welded — Reinforced hook strips.

5. Length and width of panels (width measured from outside to outside of bent hooks)—Height and length of hook strips—Degree of angle inside of hook.

6. For rectangular, non-spreader or non-blind openings: Specify direction of long slot (which dimension of cloth it parallels).

7. For dewatering decks: Size of openings in mm—Single, double or no depressions—Round or triangular profile stainless steel rods.

WRITE FOR SCREEN CLOTH BULLETIN No. 113-A1

CHECK FOR INFORMATION ABOUT THESE JOB-TESTED PRODUCTS FOR YOUR OPERATION

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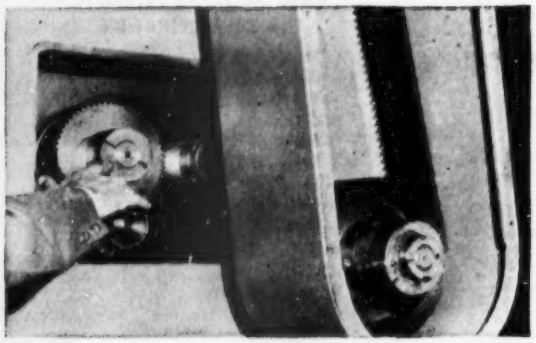


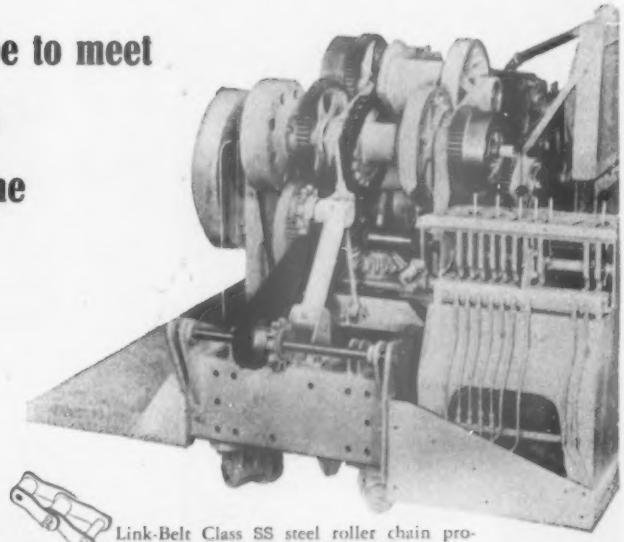
The compactness and better-than-98% efficiency of Link-Belt Silent Chain are important on this screw machine.

Front wheel drive of self-propelled rotary power lawn mower employs Link-Belt Roller Chain. (Shown with guards removed.)

Link-Belt steel chain and sprockets are part of the feeder-conveyor of this rugged self-propelled loader. The curved blades of the feeder, bolted to the chain attachments, serve as pick-up scoops.

to get the chain that best suits your drive or conveying job

Choose the size and type to meet your specific requirements from LINK-BELT's complete chain line



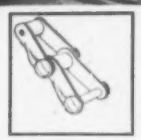
Link-Belt Class SS steel roller chain provides a positive drive yet is resilient enough to absorb impact. Here power is supplied to the boom countershaft of an outstanding shovel-crane.

LINK-BELT

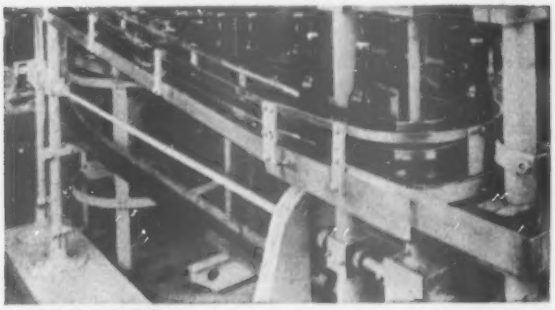
CHAINS AND SPROCKETS

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle; Scarboro, Toronto and Elmira, Ont. (Canada); Springs (South Africa); Sydney (Australia). Sales Offices in Principal Cities. 13,322

Follow the lead of all industry—for your complete drive and conveying chain needs, rely on LINK-BELT



Original equipment on this mechanical lift trimmer includes 28 strands of Link-Belt Class H pintle chain: nine transfer chains at right and 19 feed chains with attachments at left.



Bottles ride smoothly on Link-Belt universal carrier chain. On this bottle elevator, flat-top chain travels around vertical curves and sharp horizontal bends.

OPERATION RECORD
DATE LAST CHECK
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Operation records show major savings in drive maintenance since Life-Line* Gearmotors were installed

The facts are all in black and white. Operation records show that maintenance crews can service Life-Line Gearmotors more easily and quickly than previous types of drives. Records also show that Life-Lines require much less frequent servicing.

As for reasons—Life-Line Gearmotors have several design and construction features which account for this increased drive efficiency.

FOR EXAMPLE:

Split-Case Design That Speeds Inspection and Servicing. With the gear case split, we need only remove a few bolts, lift the gear cover, and all working parts are accessible. No dismantling of gearmotor or disturbing the unit's mounting.

Taper-Hardened Gears That Withstand Shocks of Heavy-Duty Service. All Life-Line Gearmotors have precision helical gears that assure accurate meshing. Gear teeth are taper-hardened from surface to core, thereby resisting wear and breakage from the many shocks of everyday service.

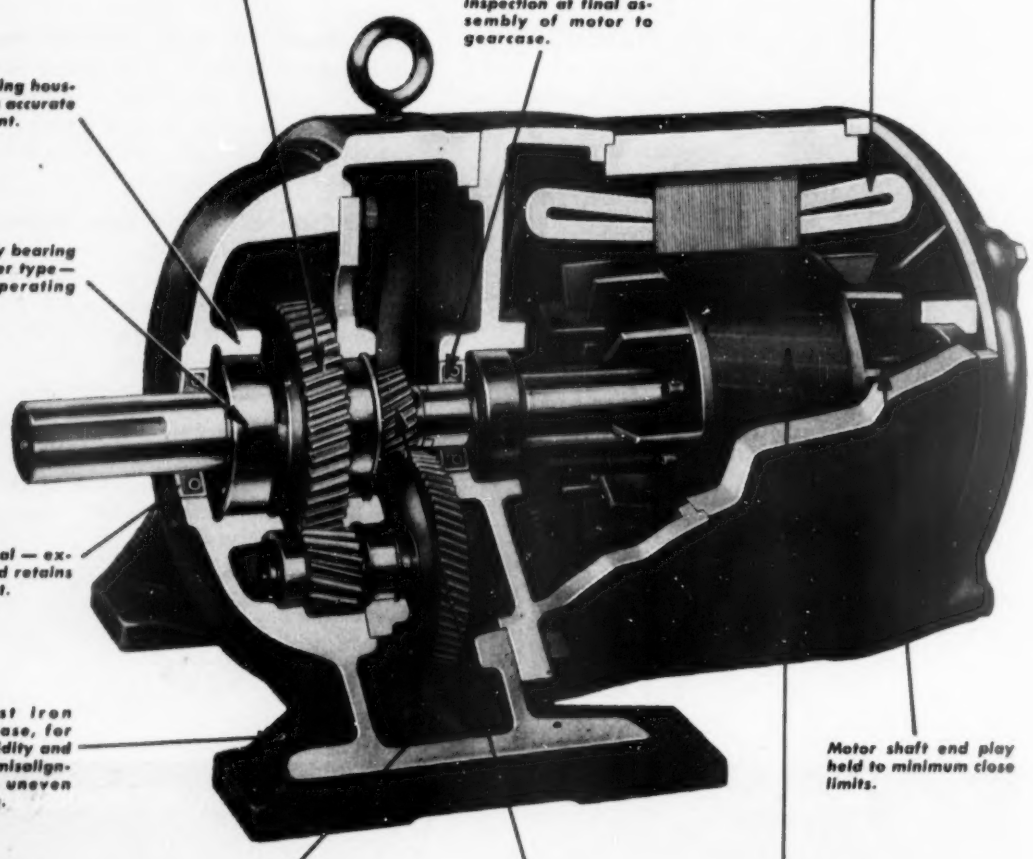
Integral Motor Design That Eliminates Need For Alignment. Life-Line Gearmotors have the motor attached directly to the gear unit. This means the drive pinion is mounted on the motor shaft and thereby does away with any coupling to align or service. As a result, the entire unit requires fewer moving parts and a minimum of maintenance.

Just call your local Westinghouse Representative for further information, he'll be glad to help you. If you prefer, write to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-07324

*Trade Mark

YOU CAN BE SURE...IF IT'S Westinghouse

NEW GEARMOTOR by



Precision processed, file-hard gears for long wear and resistance to peak overloads.

Selected positive oil seal between gears and high-speed bearing. Lengthens bearing life by sealing off abrasive matter. No blind assembly—visual inspection at final assembly of motor to gearcase.

Properly insulated and carefully impregnated windings for maximum protection and long life.

Integral bearing housings maintain accurate gear alignment.

Extra capacity bearing — ball or roller type — for severe operating conditions.

Positive oil seal — excludes dirt and retains clean lubricant.

Rugged cast iron pyramidal base, for maximum rigidity and strength. No misalignment due to uneven foot mounting.

Motor shaft end play held to minimum close limits.

Large oil reservoir — efficient splash lubrication.

Locked motor shaft pinion provides positive contact for minimum vibration on reversing service.

Precision-balanced die-cast rotor.

W3-8

ELLIOTT CROCKER-WHEELER

Gives you the speed you want, where you want it—

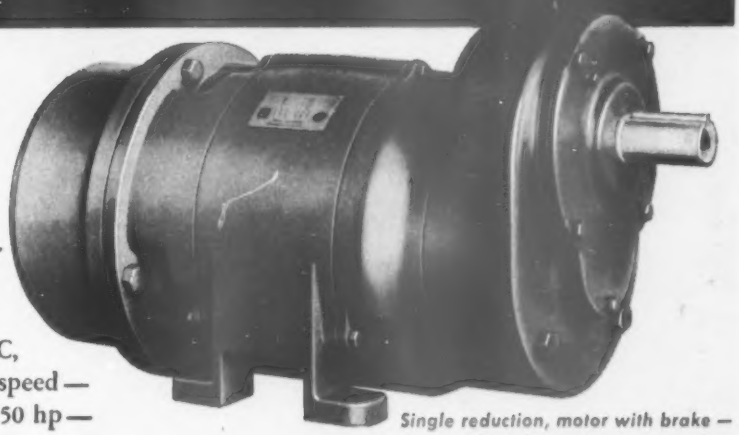
In single reduction, 780 to 280 rpm... double reduction, 230 to 45 rpm... triple reduction, 37 to 7.5 rpm—

With any Crocker-Wheeler Motor—AC, squirrel-cage, wound rotor, DC, multi-speed—in the range of frame sizes from 1 to 150 hp—

In any closure type—open-protected, enclosed non-ventilated, splashproof, enclosed fan-cooled, explosion-proof—

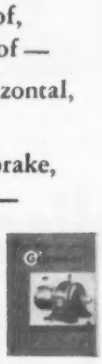
For any mounting required—horizontal, ceiling, sidewall, inclined—

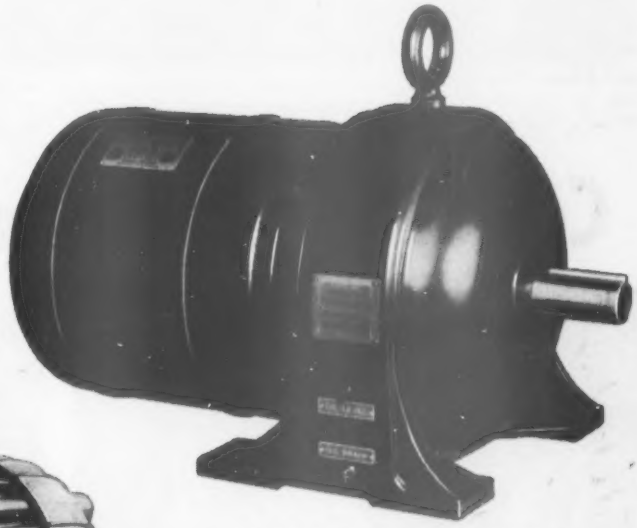
Available also with the C-W disc brake, as a complete integral power unit—



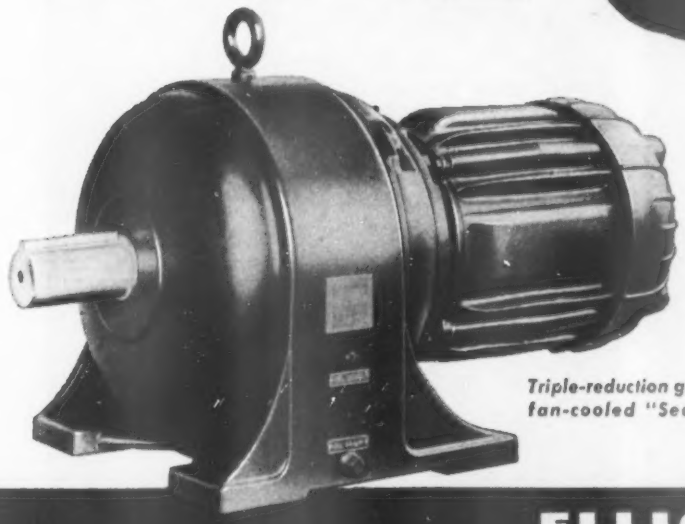
Single reduction, motor with brake—A complete integral power unit—

GET THE GEARMOTOR DATA BOOK
—ask your local Elliott District Office or write direct to Elliott Company, Crocker-Wheeler Division, Ampere, N. J.





C-W Form BA squirrel-cage motor with double-reduction gear—



Triple-reduction gear unit mounted on C-W totally-enclosed fan-cooled "Sealedpower" explosion-proof motor—

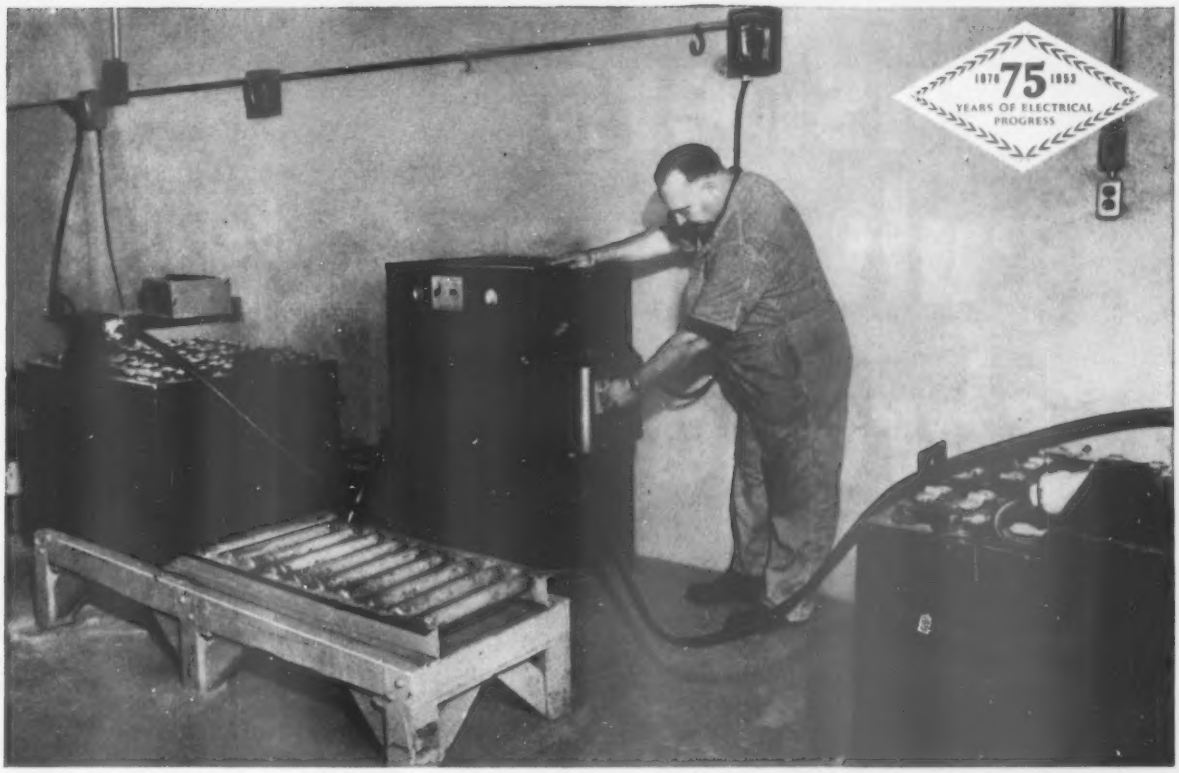
ELLIOTT Company
CROCKER-WHEELER DIVISION

ROTATING-TYPE chargers made by General Electric are adaptable to driver-ride truck batteries of both lead-acid type (6 to 24 cells) and nickel-iron-alkaline type (10 to 32 cells). Lightweight and compact, they can be mounted on balconies or other supporting surfaces (as with this group of eleven in a San Francisco plant), or stacked in tiers to save space.

Correct charger application helps

FULLY AUTOMATIC rotating-type G-E chargers are easy to operate. Plug in charger, set timer, and automatic control does the rest, shutting down unit when battery is fully charged.

VERSATILE rectifier-type G-E chargers can be adjusted for charging different types of truck batteries, and are fully automatic. Both high and low rates can be adjusted over wide ranges.



RECTIFIER-TYPE G-E chargers for lead-acid or nickel-alkaline batteries in driver-ride or driver-lead trucks need no special foundation and are easy to install. Since they occupy very little space, they can even be located in truck working areas, as in this New York food plant. This permits "on-the-spot" charging, lets you get more working time from your trucks.

maintain production continuity

Selection of the right G-E charger—for the correct plant location—assures top performance of your electric trucks

When batteries are properly charged, your electric trucks keep rolling, materials move fast, and production goes up. But proper charging means selecting the right charging equipment for *your* particular needs. That choice is made easier by General Electric's complete line of rotating and rectifier chargers—backed by skilled G-E application help.

Whether your chargers are to be centrally grouped or spotted throughout your plant—for large fleet needs or smaller operations—the equipment you get from G.E. (1) does the job economically and dependably, (2) is the right equipment for your needs, (3) is more efficiently used because of the recommendations that accompany it. When you plan for new charging equipment, be sure to contact your G-E Apparatus Sales Representative. General Electric Company, Schenectady 5, N. Y. 669-6

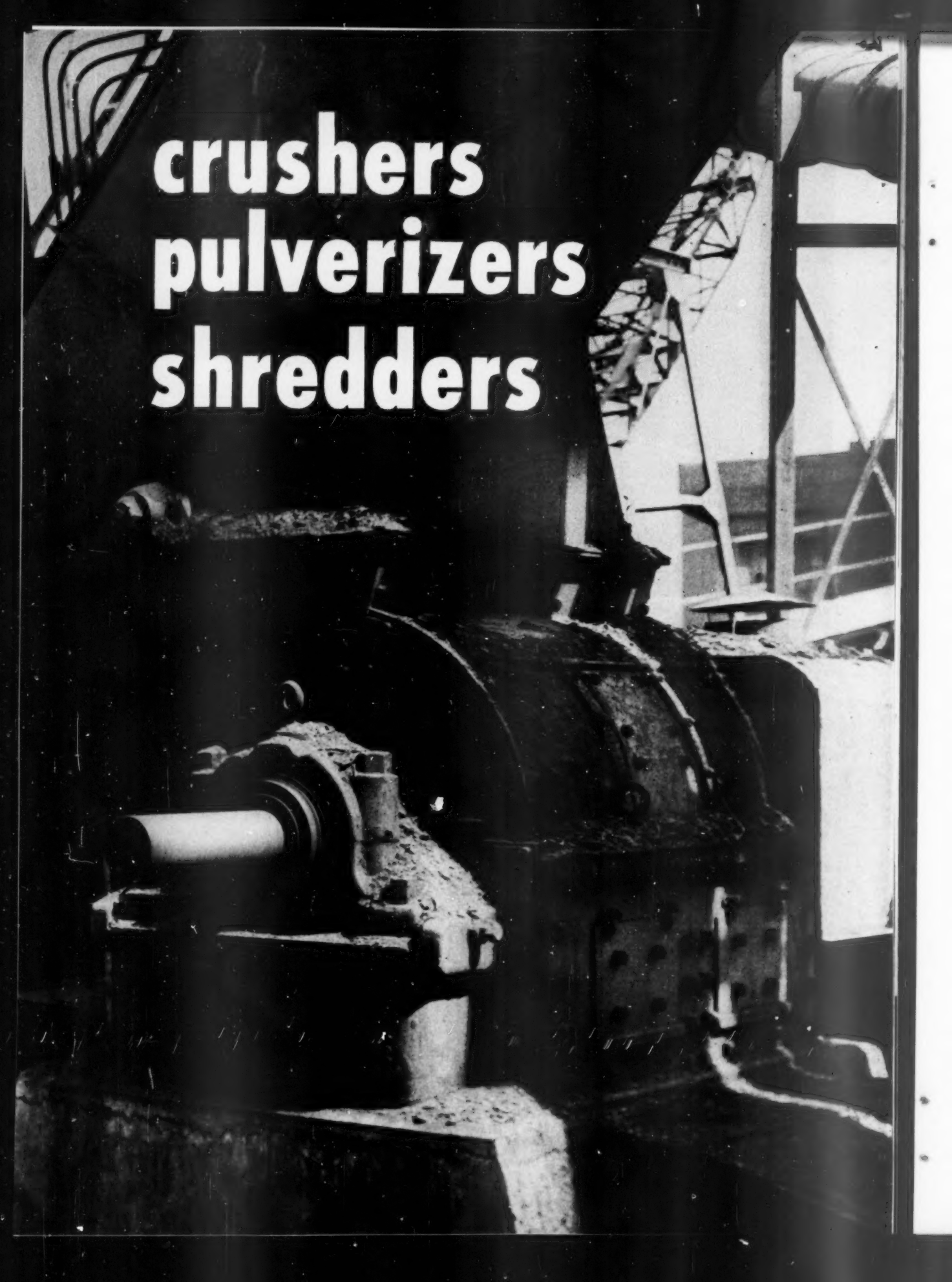
FREE MANUAL ON MATERIALS HANDLING

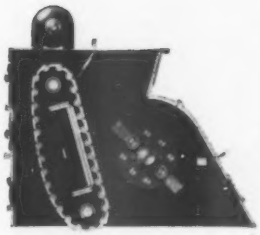
For your copy of the manual "Materials Handling," part of G.E.'s "More Power to America" program, write on your letterhead for Bulletin GEA-4962. To see the accompanying film, ask your equipment supplier or G-E Apparatus Sales representative.

Engineered Electrical Systems for Materials Handling

Conveyor drives • Crane drives • Hoist drives • Industrial truck drives and battery chargers

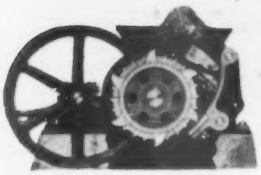
GENERAL ELECTRIC

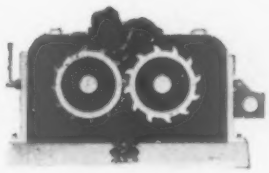

crushers
pulverizers
shredders

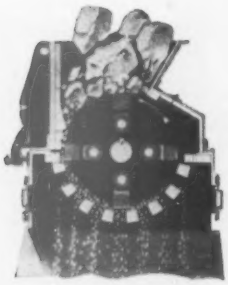


MUD HOG Crushers with traveling breaker plate

Single Roll, Double Roll and FLEXROLL Crushers







MIRACLE HAMMER Crushers for large capacities — large feed

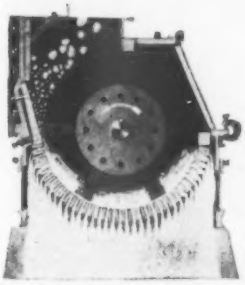
HIGH CAPACITY UNIFORM REDUCTION

A Complete Line of crushers, pulverizers, shredders for reducing all classes of material to desired size. Several types are shown.

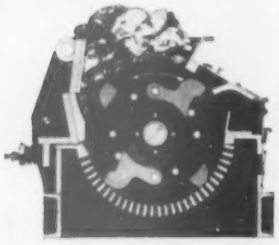
Built for specific applications — in a wide range of sizes — some with metal catchers — to suit capacity requirements.

Our modern test laboratory enables us to determine the proper type and size of machine best suited to the need in advance of expenditure or installation. Sample of material may be furnished, if desired, with results kept in strict confidence.

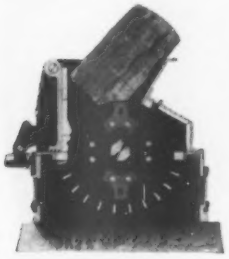
CRUSHER DIVISION



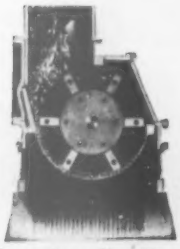
Type A Crusher with swing hammers



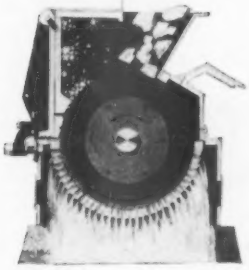
FLEXTOOTH and Rotary Ring Crushers



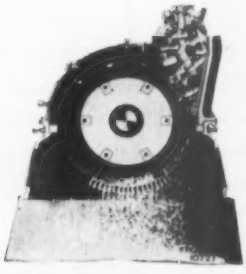
Bale Breakers, Pulp Lap and Crude Rubber Shredders



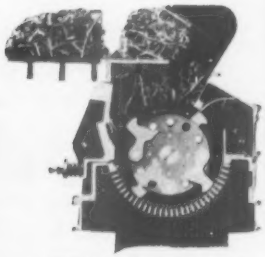
Screenings Shredders for chips, sewage, etc.



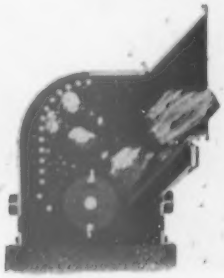
Type B Crusher with swing hammers



Type E Shredders for food or wood products



FLEXTOOTH Metal Turnings Crushers



ROCKBUSTER for reducing hard, friable material

THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

Columbus 16, Ohio

sales offices and distributors in principal cities

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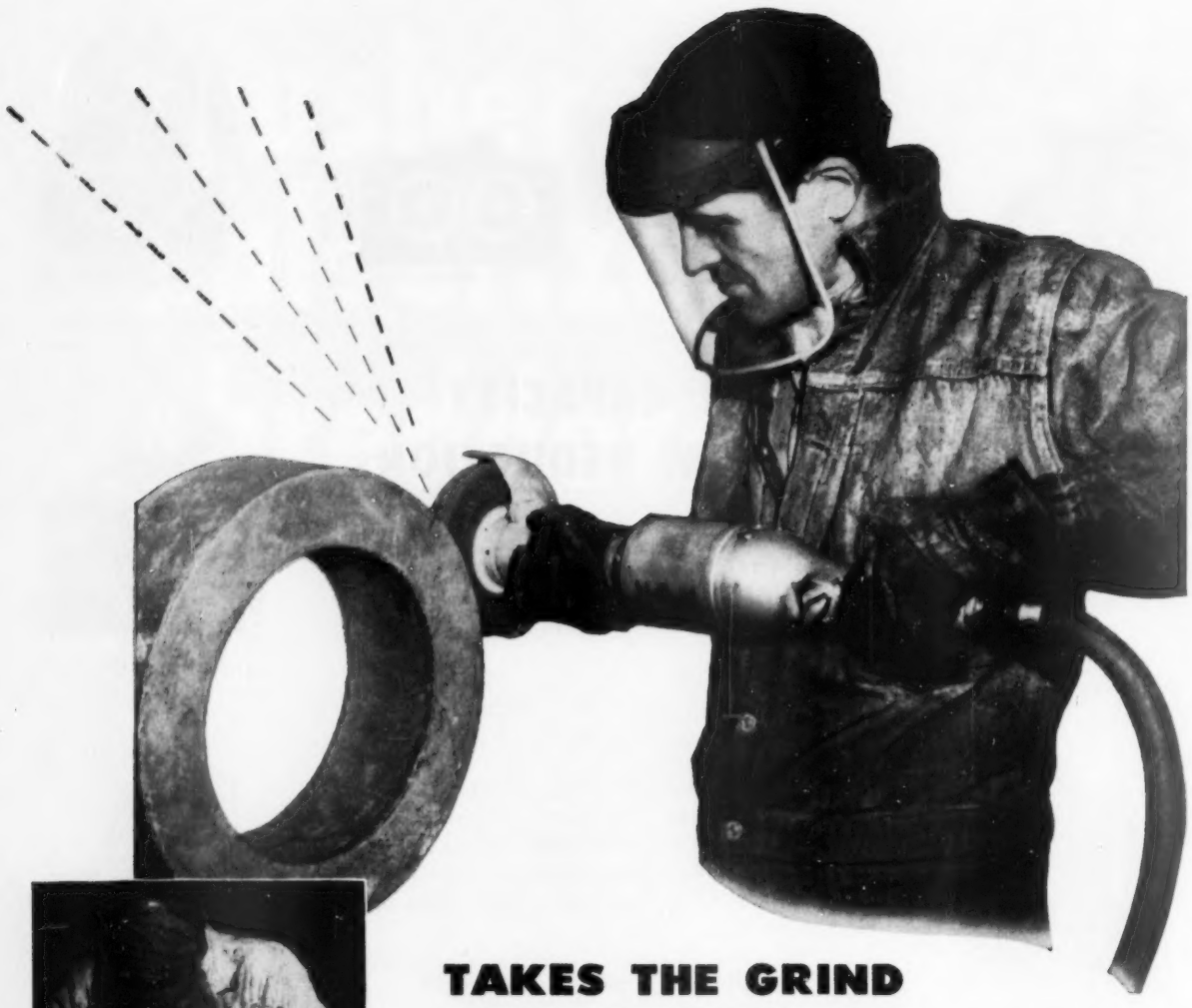
IF IT'S MINED, PROCESSED OR MOVED

. . .IT'S A JOB FOR JEFFREY!



TAKES THE GRIND OUT OF GRINDING!

THAT'S RIGHT! The CP Steel Clad Grinder takes the continuous beatings of heavy industrial usage right in its stride—and with practically no time out for maintenance. Spindle and motor housing are of lightweight steel clad construction for longer life and ease of handling. Constant speed governor and a new, larger horsepower air motor holds wheel at most efficient cutting speed—from no load to full load, cuts grinding time—takes the grind out of grinding! Available in five sizes from 4″ to 8″ grinders and many of the parts are interchangeable between sizes. Write for Catalogue 564, *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*

Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

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• NEW HANGING SCALES • NEW MOTOR TRUCK SCALES • NEW TRACK SCALES • NEW MILK RECEIVING SCALES • NEW OVER-UNDER SCALES •

44 ways better...

A great new line of Toledos! *44 new features* are now added to the traditional accuracy and dependability of Toledo Scales including—double pendulum mechanism in one-piece sector design . . . dial can be installed to face any of eight directions . . . new clean-line design with handsome gray finish. Complete range of types and capacities. Get your scale information up-to-date . . . write today for the new condensed catalog No. 2001. Toledo Scale Company, Toledo 1, Ohio.

Model 2181—New version of the world's most widely used portable dial scale

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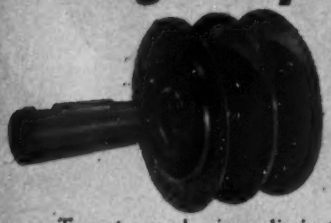
HEADQUARTERS FOR SCALES

VARI-PITCH SHEAVE

Flexible Speed Control With 3 Wide Range Sheaves

THIS NEW *Texrope* sheave makes adjusting the speed of drives faster and easier than before. If you need up to 2 to 1 speed variations on 1½ to 30-hp drives, it will pay you to buy *Vari-Pitch* sheaves . . . the only sheaves with all these features:

Magic-Grip Mounting

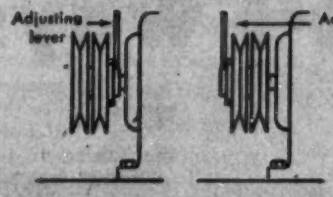


For fast mounting! One screw makes or breaks vise-like grip of sheave bushing on motor shaft. Rigid lock-type *Texrope* mechanism eliminates vibration in the drive. No peening or roughening of moving parts.

Fast Adjustment

To change sheave diameter — thereby changing speed — simply turn a single adjusting screw using a lever rod that slips through a hole in the head of the screw. No more fumbling with screw drivers. Adjustment is fast and accurate.

Two-Way Mounting



Sheave can be mounted on motor shaft so adjusting screw is either toward or away from motor bearing, as indicated. This feature is especially important in installations where space is limited.

Allis-Chalmers A-3885
Milwaukee 1, Wisconsin

Send me complete specifications and engineering data on the new *Texrope* Wide Range Sheave . . . 2057811.

Name .....

Title .....

Company .....

Street .....

City ..... State .....

Texrope, Vari-Pitch and Magic-Grip are Allis-Chalmers trademarks.

ALLIS-CHALMERS

it pays *up to 50%* to think

FIRST

about last operations

Parker-Kalon Self-tapping Screws have been cutting assembly costs of millions of metal and plastic products for over 35 years. Yet, today, thousands of manufacturers, who could gain the same benefits, still use such slow-down fastening methods as machine screws in tapped holes, bolting, and riveting. Why?

The reason is that too many product engineers think *last* about assembly because it is a final operation, then follow habit or custom in specifying fasteners.

Best way to make sure of savings you have been missing is to think *first* about fastenings . . . compare methods for simplicity, speed and security. Records show that in 7 out of 10 cases, P-K Self-tapping Screws show substantial savings, often up to 50% and more.

A P-K Assembly Engineer will help you get the facts you need. He'll call at your request. Parker-Kalon Corporation, 200 Varick Street, New York 14.

P-K Type A
— the FIRST Self-tapping Screw

The INDUSTRIAL DISTRIBUTOR steers your Supply Dollars to the best values.

PARKER-KALON®

The Original **SELF-TAPPING SCREWS**

GET THIS GUIDE TO LOWER ASSEMBLY COST

Filled with facts you need to plan for lowest cost when you plan assemblies. Ask your P-K Distributor, or write Parker-Kalon for Form 475-D.

This mark △ on every P-K Self-tapping Screw identifies it as genuine.

Ford Moves Faster with NESTIER® On The Job

NesTier baskets in use at Ford Motor Company's Mound Road plant in Detroit. Parts taken from washer are quickly drained in baskets while moving to next operation.

NesTiers are the *standard* containers that do every *small parts handling job*—from stockroom to loading dock!

The NesTier Expanded Metal Basket shown here moves parts through all phases of production—eliminates need for changing containers before and after cleaning operations.

NesTiers *nest* when empty to save space. When filled, they *tier* in rigid stacks, with parts in each container visible, easily accessible. NesTiers can be transported by roller or overhead conveyors, on pallets and skids—can be easily carried by hand.

At every point, NesTiers speed the flow of work, *cut production costs!*

3 standard sizes in sheet metal, aluminum, stainless, expanded or perforated metal.

WRITE NOW FOR FREE FOLDER
which gives full description of all units in the NesTier System. Our representatives will assist you in engineering a complete small parts handling system in your plant. They'll also arrange a NesTier demonstration for you, at your request.

THE CHAS. WM. DOEPKE MANUFACTURING CO., Inc.
ROSSMOYNE, OHIO

With the All-Motor Type,

ALL-STEEL FALK Motoreducer

you can interchange motors in minutes...*on the job!*

Fast, easy maintenance gives savings in time and money

With the *all-steel,* All-Motor type FALK Motoreducer . . . the only complete and compact motorized reducer with a separately mounted, resilient Steelflex coupling-connected motor . . . you can replace or interchange motors, *or even parts,* in minutes—*on the job,* without long and costly "down time"! Ratios can be changed (within capacity) without motor modification.

Any make, speed, or type of standard foot-mounted motor within the unit's AGMA rating is usable *without modification* on this All-Motor type Motoreducer. Motors with variable speed drive arrangement can be used, if desired. No "partial" motor or special shaft is required in event of motor replacement—simply use a complete motor, available for quick delivery from factory or local stocks without expensive delays.

Add to these exclusive maintenance-saving advantages the FALK "In-built" Factors, described at the right, and you have an unbeatable combination of quality, application adaptability, dependability, long-range economy, and dollar-for-dollar value. Write for Bulletin 3104.

Every FALK Motoreducer has these "In-built" Factors—

Positive Lubrication. Large sump capacity . . . oil-tight construction assures clean lubricant . . . direct dip of revolving elements provides positive lubrication at all speeds.

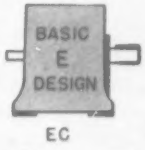
Wide Speed Range. Selective ratio combinations provide output speeds from 1.5 rpm to 1430 rpm with stock gears.

Streamlined inside and outside. Smooth, clean surfaces; machine welded construction conforms to NEMA motor frames.

Sealed Housings. Dual closures and one-way vents keep oil *in,* dust and moisture *out.* Units are splash-proof, leakproof, dustproof.

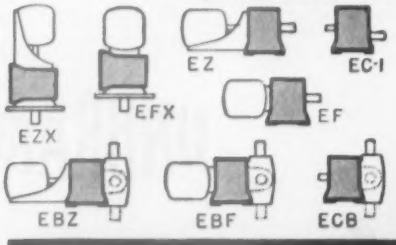
Precision Gearing. Heat treated alloy steel, precision cut and shaved helical gearing throughout . . . quiet-operating crown shaved pinions . . . taper bored gears for easy ratio changes.

All-steel Housings. Unbreakable, strong, rigid. Generous overhung load capacities provided by wide bearing spans, large shafts and bearings.



EC

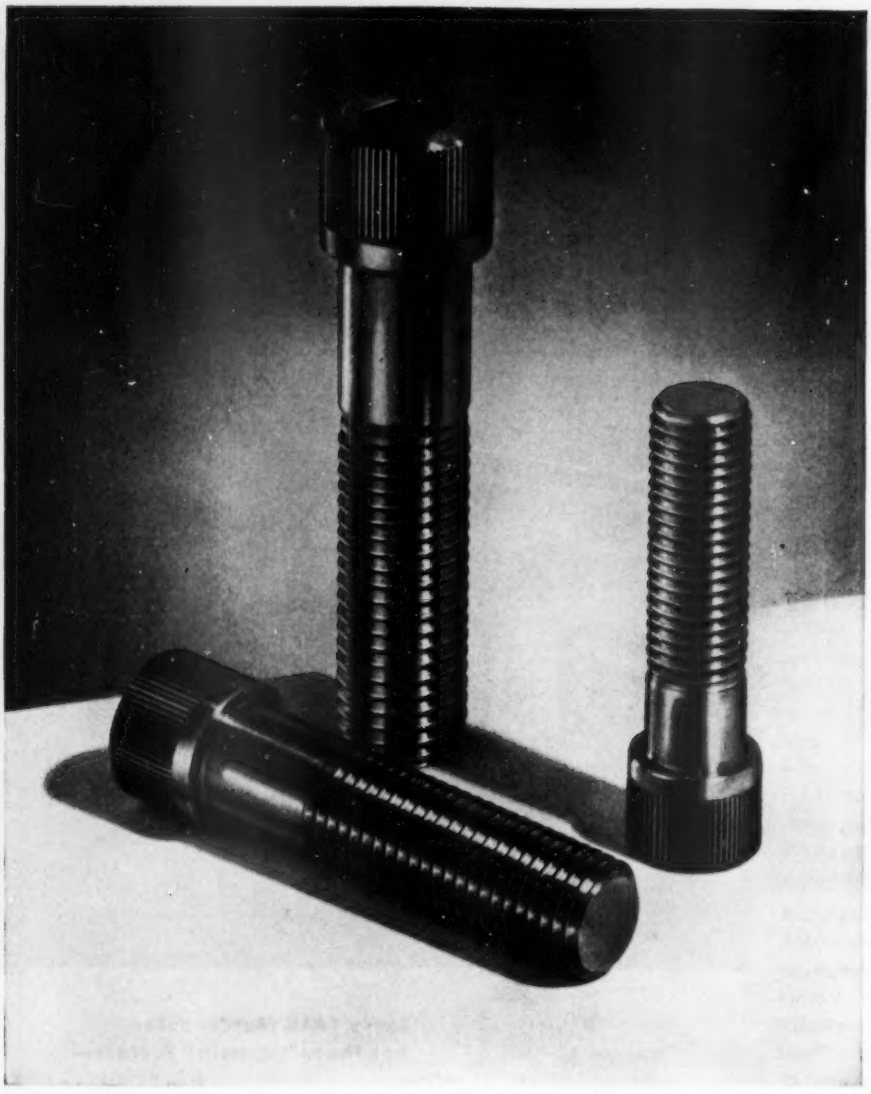
The basic E design permits maximum use of standardized parts . . . closer control over materials, processing, inspection and assembly . . . resulting in faster delivery from interchangeable stocked assemblies.



FALK ...a good name in industry

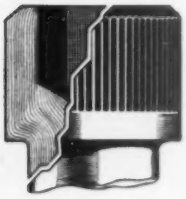
THE FALK CORPORATION • 3001 W. Canal St. • Milwaukee 8, Wis.

WRITE FOR BULLETIN 3104



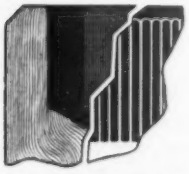
Our Fiftieth Year

A START FOR THE FUTURE

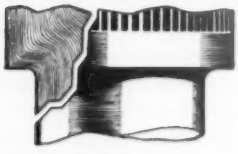


HEAD. Forged for maximum physical strength. Diameter and height are precision controlled—any deviation could be serious.

KNURLS. Originated by SPS to provide easier handling and faster assembly by oily fingers.



SOCKET. Uniform depth and size assure strength and maximum torque in wrenching—extremely important in a socket cap screw.



FILLET. Completely formed to provide maximum resistance to shear and continuous grain flow throughout length of screw.

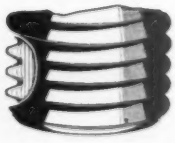
There's much more to an UNBRAKO than meets the eye

When you pick up a socket cap screw, you don't stop to examine it—it's so commonplace.

If you did, and it's an UNBRAKO, you'd marvel at the knurled head, the uniform hex socket, the smooth shank, the precision threads, all combined to make a strong, close tolerance fastener.

Quality control—from the selected alloy steels to the finished product—makes an UNBRAKO Socket Cap Screw what it is, the finest you can buy. Write for UNBRAKO Standards. SPS, Jenkintown 11, Pa.

Stocked and sold by leading industrial distributors everywhere



THREADS. Fully formed to maintain continuous grain flow and prevent shearing. Made to Class 3 fit. Controlled fillet at root of threads gives added tensile and fatigue strength.

UNBRAKO® SOCKET SCREW DIVISION

SPS JENKINTOWN PENNSYLVANIA

how BARRETT helps you keep maintenance costs down

POWEROX IS A GOOD EXAMPLE OF THE BARRETT MONEY-SAVING LINE.

Rugged stamina—long service life—simple construction, all are POWEROX performance features; your assurance of minimum non-productive down time for repairs. You will find a labor-saving Barrett product designed to solve your handling job . . . economically!

HAND AND POWER LIFT TRUCKS
• HI-LIFTS • TELESCOPIC LIFTS •
AISLE-SAVER • LIFT-A-LOFT •
NIFTY-SYSTEM • SKIDS • DOLLIES

NEW

YOUR PLANT MANAGER WILL WANT THIS INFORMATIVE CATALOG 535 on the complete Barrett line. A request will bring his copy, promptly!

2 Remove hood . . . expose working parts for quick adjustment.
It's that fast—and simple! No wasted time. Barrett design makes it easy for you to "get at" the adjustment job in a hurry.
POWEROX Model POK. Walkie type. 4000 to 6000 lb. capacities.

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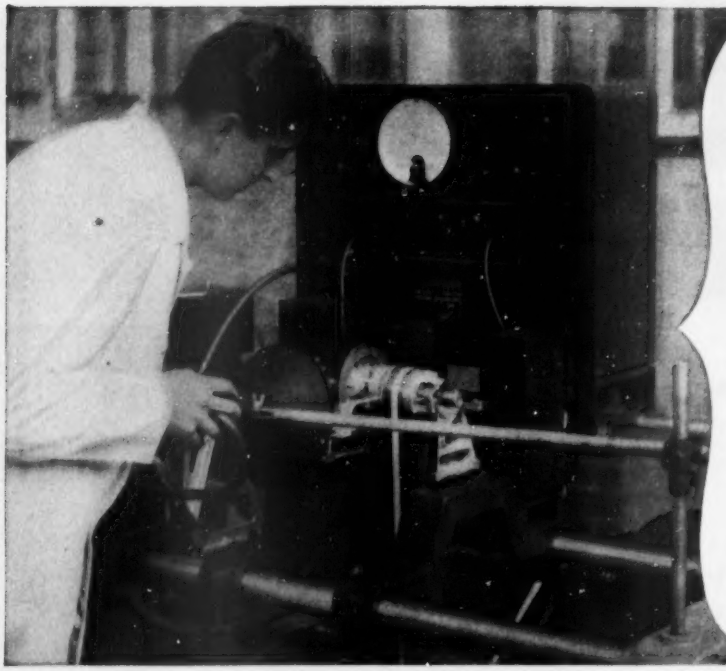
Barrett Handling Equipment

BARRETT

ONE MAN DOES MORE THAN 3 OR 4...WITH A BARRETT



ACEC

OUTSTANDING DYNAMIC BALANCE

ACEC Motors are dynamically balanced far in excess of NEMA standards at no extra cost. Maximum amplitude of vibration of ACEC Motors measured according to NEMA-MGI-4.21 (Oct. 1949) specification.

Location of Measurement	3 HP 1800 RPM	5 HP 1800 RPM
Pulley End Bearing Housing:		
Horizontal Amplitude	0.00035	0.00025
Vertical Amplitude	0.00025	0.00025
All other parts of Motor	0.00020	0.00015 to 0.00020

NEMA (MGI-4.20) Recommended Standard

Frame Sizes	Amplitude in Inches
203-254	0.00100
284-364	0.00150
365-505	0.00200

THESE QUALITY + FEATURES SHOW WHY ACEC MOTORS DELIVER BETTER PERFORMANCE

Dynamic balancing far in excess of NEMA Standards, as shown above, practically eliminates vibration. Equal load distribution on bearings obtained in ACEC design greatly prolong life of these bearings—assures a longer lasting, smoother running motor *at no extra cost to you.*

Tightly sealed bearing enclosures keep lubricant in and dirt and foreign particles out. ACEC motors operate at any angle.

Rounded stator slots top and bottom assure tighter fitting stator windings—eliminate voids that collect dirt and moisture, shorten insulation life.

"Baked-on" insulation. Oven-dried polyvinyl-acetal insulated windings receive two additional coats of "baked-on" plastic insulating varnish for maximum dielectric strength.

Simple, rigid assembly results from cast iron frame and end shields and use of 4 through-bolts with 8 nuts. End shields can be removed without disturbing bearings on shaft.

Rigid quality control maintains quality of materials used in ACEC motors within the narrowest limits. Every motor receives thorough testing—carries a factory guarantee.

ACEC Motors offer these and many other quality features, *yet they're priced below most other motors.* Manufactured strictly to NEMA Frames and Specifications by one of the world's largest electrical manufacturers, they are available in a wide variety of types from **300 ACEC Distributors and Service Shops** across the nation.

No matter what your motor requirements, it will pay you to investigate ACEC's top-level performance *at lower prices* by writing to the addresses listed below.

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BELGIAN ELECTRIC SALES CORPORATION

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ACEC Motors

Aero-Commander. Seats 6. Powered by two 260-h.p. Lycoming air-cooled, geared engines.

Grumman Widgeon Conversion. Amphibious flying "office" featuring 260-h.p. air-cooled, geared engines by Lycoming.

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You are now looking at the "wings" carrying America into a great new era of safe, economical executive transportation. Each of these twin-engine, multi-passenger planes is powered by Lycoming . . . long a leader in the up-to-500-h.p. engine field. Each has the double dependability of *two* air-cooled Lycoming engines—so powerful that the planes can safely fly and land with a full load *on one engine alone.*

To fly any time, any place . . . these are the safest "offices" *over* earth . . . the soundest investments in executive aircraft *on* earth. *For further information, write us on your letterhead.*

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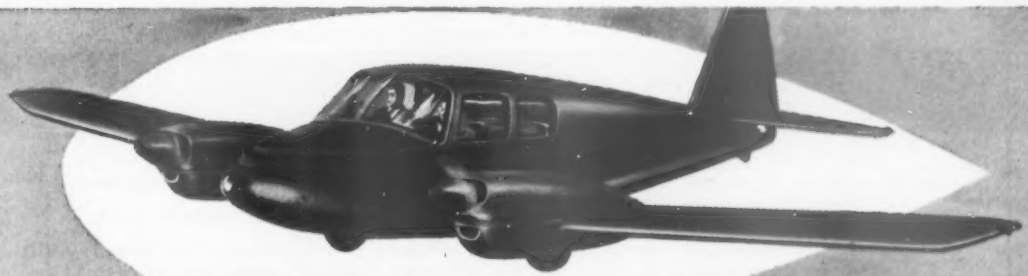
Lycoming-Spencer Division, Williamsport, Pa. AVCO Bridgeport-Lycoming Division, Stratford, Conn.

Air-Cooled Engines for Aircraft and Industrial Uses. Precision-and-Volume Machine Parts. Gray-Iron Castings. Steel-Plate Fabrication



Piper Apache. Seats 4. Dependably powered by two 150-h.p. air-cooled Lycoming engines.

Riley Twin Navion Conversion. 4-place executive plane powered by two 150-h.p. air-cooled Lycoming engines.

No. 6 in a Series

Carbides dictate the conditions

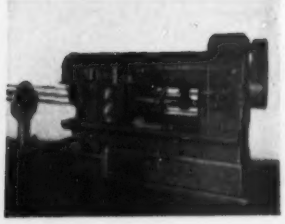
All accepted cutting tool materials have the common characteristic of specifying the conditions under which they will perform at maximum efficiency. And if the results are sufficiently promising the conditions will eventually be met.

ONE HUNDRED PERCENT carbide application on a multiple spindle bar automatic makes specific demands on both machine and personnel for successful use. The part illustrated is from regular production on comparative runs, in a plant where the conditions were met.

The Conomatic Carbide Development program can be of possible service to you in determining the suitability of your work, or any part of it, to 100% carbide tooling. Just ask your Cone Representative for details, or inquire direct.

MATERIAL — BRASS: Pickoff attachment in 6th position permits machining piece complete.

	HSS	CARBIDE
Cycle Time	12 secs.	**6 secs.**
Work Spindle Speed	1125 R.P.M. at 331 S.F.	**1528 R.P.M. at 450 S.F.**
Tool Wear	50,000 pcs. per grind	**unlimited number of pieces per grind**



Conomatic } CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

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48" Wide Embossed Industrial Corrugated ...For Lower Installed Cost, Improved Appearance!

All the advantages that have made Reynolds Aluminum Industrial Corrugated a sweeping success throughout industry... rust-proof permanence, lowest maintenance, high insulation... now at even lower installed cost and with improved appearance! With these new 48" sheets, side laps take 30% less metal, 30% fewer fasteners... and there are 30% fewer sheets to handle. With the new stipple-embossed finish, the wider-spaced laps tend to disappear... making a handsome, uniform, textured effect. Call on Reynolds for literature, technical and application details.

Offices in principal cities. Check your classified phone book for our listing under "Building Materials." Or write Reynolds Metals Company, Building Products Division, 2007 South Ninth St., Louisville I, Kentucky.

DESCRIPTION:

METAL THICKNESS: 0.032 inch (22 U.S. Std. Ga.)

FINISH: Embossed.

LENGTHS: 5', 5' 6", 6', 6' 6", 7', 7' 6", 8', 8' 6", 9', 9' 6", 10', 10' 6", 11', 11' 6", 12'. (Special lengths cut to order subject to inquiry.)

WIDTH: Over all width 48⅛", nominal coverage 45⅛", 1½ corrugations side lap.

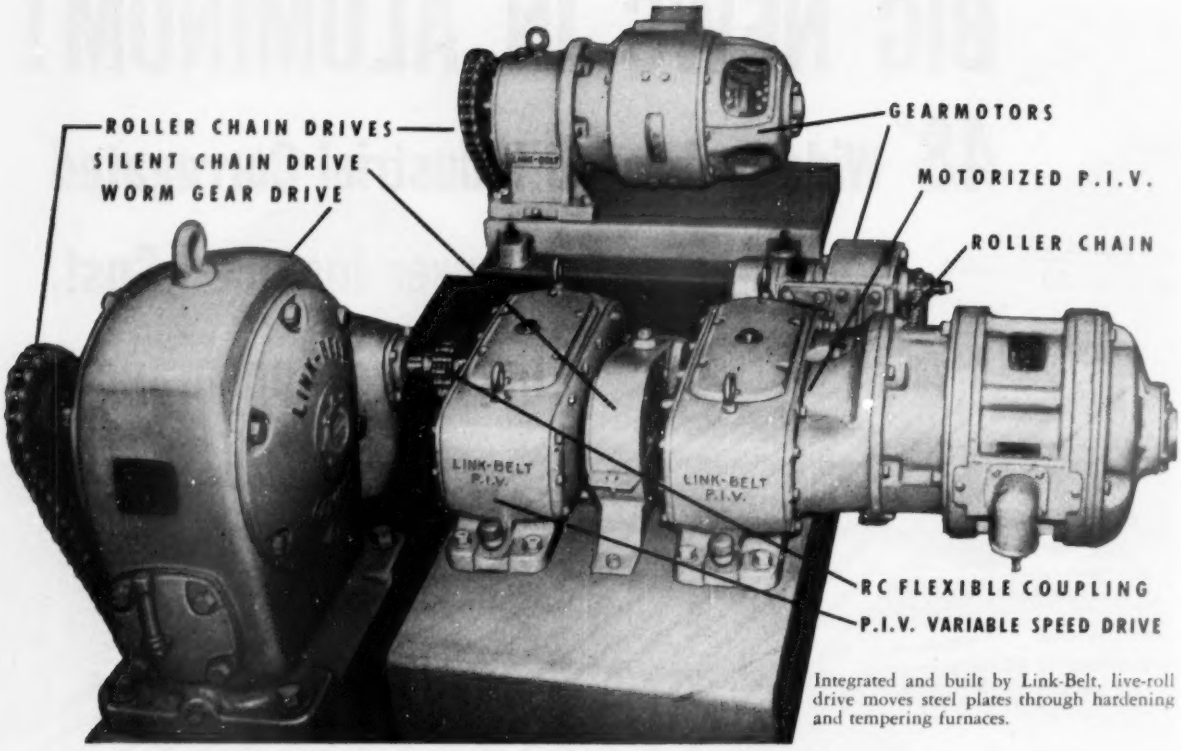
CORRUGATION: Pitch 2.667" center to center, depth ⅞", 18 crowns, 18 valleys, one edge up, opposite edge down.

WEIGHT: 56 pounds per 100 square feet of formed sheet.

Standard .032" mill finish Industrial Corrugated also available—35" width, same lengths as above.

REYNOLDS Lifetime ALUMINUM INDUSTRIAL CORRUGATED

SEE "MISTER PEEPERS," starring Wally Cox, Sundays, NBC-TV Network.



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IF you have a complex power transmission application, use Link-Belt as a single source for all the necessary components and engineering service. Nowhere else can you find so great a background of experience . . . so wide a range of quality components.

As builders of industry's most complete line of power transmission equipment, Link-Belt offers you helical, herringbone and worm gear drives, chain drives, fluid drives, variable speed drives, bearings, clutches, couplings, etc.

Link-Belt gives your problem careful analysis . . . determines the exact drives and controls for optimum performance. What's more, we pre-assemble various components for greater protection . . . carry through complete installation, if desired, down to the last detail.

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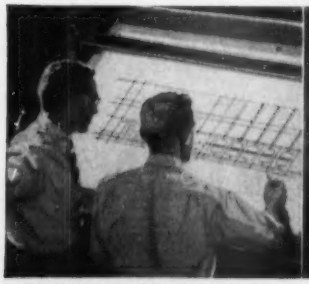
POWER TRANSMISSION EQUIPMENT

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities. 13,129



OVERALL ENGINEERING. Vast experience of design and field engineering staff integrates all factors, assures expert planning.

ALL COMPONENTS. Link-Belt builds a complete line of power transmission machinery, provides components of top efficiency.

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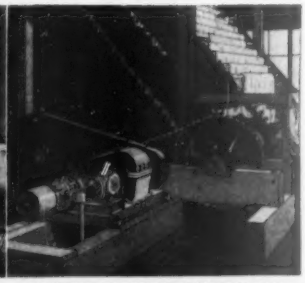

SINGLE RESPONSIBILITY. When you rely on Link-Belt as a source, we accept responsibility for overall operation.

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PAYLOADERS Blast Bulk Handling Costs

Scoop-up? Carry? Dump? Spread? Load? Pile? Pour? . . . "PAYLOADER" tractor-shovels will do all of these bulk material handling jobs for you and many more . . . up to three tons at a time . . . travel at speeds up to 28 miles per hour . . . work inside buildings or outside on pavement or ground.

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Tells how and where to look for signs of inefficient bulk materials handling . . . how to analyze, organize and set up an efficient handling system. Plus many useful tables and data. Write for "Bulk Materials Handbook."

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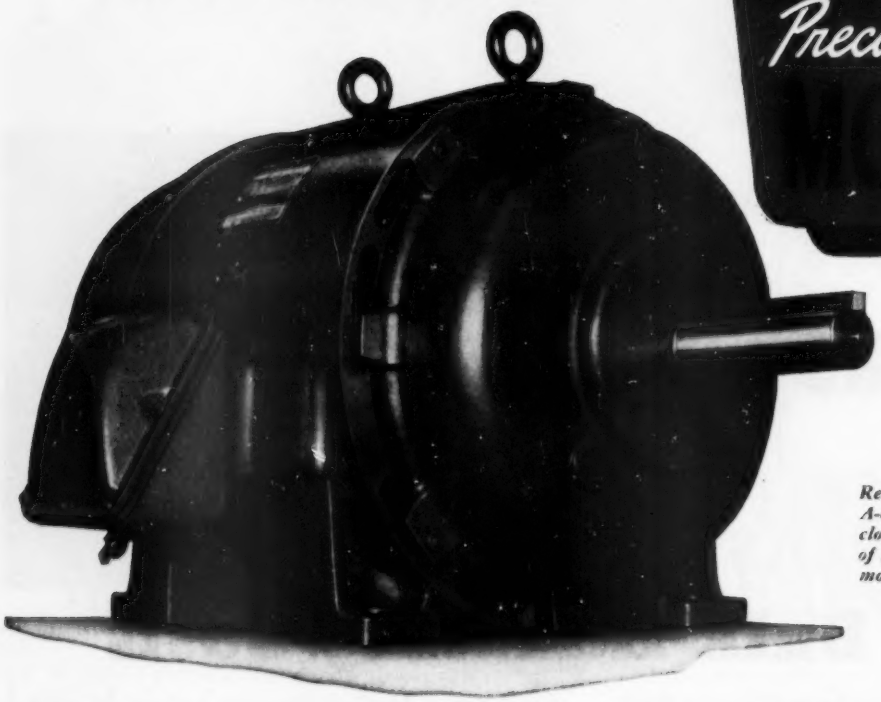

Reliance Totally-enclosed Fan-cooled A-c. Motor. All other standard enclosures available, with wide choice of mechanical designs and special mountings. Ratings from 3/4 to 300 hp.

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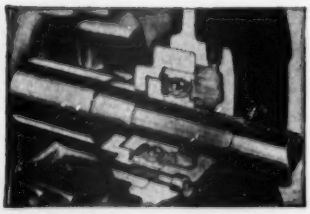

...AND THE BEST PRE-LUBRICATED BEARING DESIGN

The Reliance pre-lubricated bearing provides *four times more operating hours without re-lubrication* than any other bearing used in motors today. And—whatever your lubrication schedule—*you just can't grease 'em wrong!* To get the complete "inside story" on motor bearings, write today for Builetin B-2201. It contains hard facts on the advantages of the Reliance pre-lubricated bearing design, with cutaway view, cross-section diagram, comparison chart, and statements by bearing manufacturers. B-1458 J

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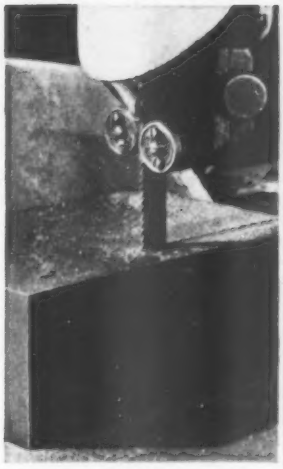
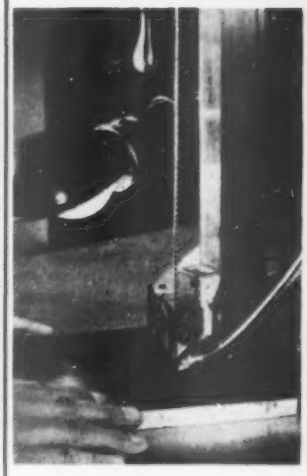


For Heavy Production Cutting

You'll like this rugged, break-resistant standard tooth blade for trimming gates and risers off castings, cutting metal bars and other tough production work. Hardened along the tooth edge only, it cuts fast, stays sharp, gives a longer run for your money! All standard widths and tooth spacings. Furnished in 100′ and 300′ coils or welded to length for specific machines.

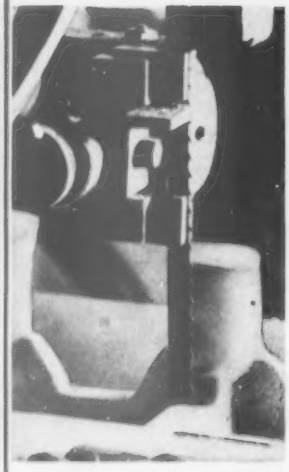


For Contour Cutting and Die Making

In the narrower widths, this edge-holding, smooth cutting blade is an outstanding favorite for contour work. Because the teeth are set with absolute evenness on both sides of the blade, you can depend on straight, on-the-line cuts with no "leading." All standard widths and tooth spacings furnished in 100′ and 300′ coils or welded to specified length.

For Horizontal Cut-Off Work

Furnished either Regular or Wavy Set in the wider widths, this Simonds-made standard tooth blade easily handles the wide variety of cutting required in general shop and steel warehouse operation. All sizes come in 100′ and 300′ coils or welded to length.



For Cutting Soft Materials

This Skip-Tooth Hard Edge Blade has extra gullet capacity with maximum blade strength . . . gives fast, trouble-free service in cutting aluminum, magnesium, plastics, plywood and hardwood. All standard sizes available in 100′ and 300′ coils or welded to length for specific machines.

Get Delivery From Stock From Your Industrial Supply Distributor

SIMONDS SAW AND STEEL CO.

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MECHANIZE WITH

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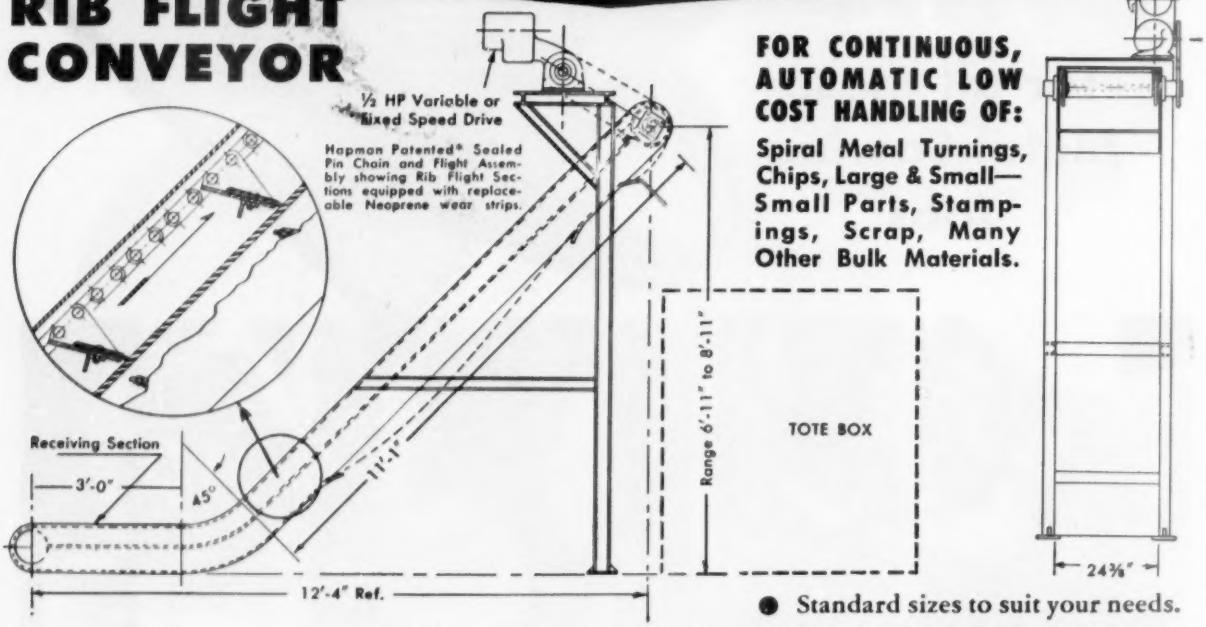

FOR CONTINUOUS, AUTOMATIC LOW COST HANDLING OF:

Spiral Metal Turnings, Chips, Large & Small—Small Parts, Stampings, Scrap, Many Other Bulk Materials.

- **Size can be altered for special applications.**
- **Shipped completely assembled ready for electrical connection at your specified voltage.**
- **FACTORY TESTED AND GUARANTEED**

- Standard sizes to suit your needs.
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- Rugged welded steel construction for rigidity.
- Choice of ½ H.P. fixed or variable speed drives.
- No chain take-up required.
- Adaptable for removal of above listed materials from coolant tanks without loss of coolant.
- Designs available for long distance above-or-below-floor conveying and also for adaptation as original equipment design for machine tool builders.

*Patent Nos. 2,400,502, 2,607,469

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DIVISION HAPMAN-DUTTON COMPANY
KALAMAZOO MICHIGAN

One of these babbitts is best for your bearing

AMERICAN Brake Shoe COMPANY

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LOOKING AHEAD IN BUSINESS

Last-minute round-up as we go to press

Industrial output as a whole is still high. But here and there you can see signs that we're coming down from the top of the boom. Keep your eye on steel. Mills have been operating below capacity for some time now. And they're not booking fourth-quarter business very fast.

There's also been a slowdown in the output of building materials, notably lumber and plywood. In the auto, appliance, and farm equipment industries, plant shutdowns have been caused by mounting inventories. The container industry is another that may face inventory troubles.

•

Altogether, inventories were building up at an annual rate of almost $9-billion—about three times normal build-up—in the second quarter of 1953. This was mostly in durable goods industries. But non-durables went up, too. Manufacturers and distributors alike piled up goods.

This indicates that we can't sustain production at the second-quarter rate (241 on the Federal Reserve Index). The industries where output is dropping are those that were under greatest pressure to boost production earlier—steel, building, autos, and other hard goods.

On the other hand, output of petroleum, chemicals, non-ferrous metals, and textiles shows gains in recent months. And this group may very well finish 1953 at a higher level than it began. The textile and apparel industries have had a sharp pick-up from heavy sales of summer clothing.

•

You can get an idea of today's factory production potential from these facts: In June, retail sales in the U.S. were $14.7-billion—6% higher than a year ago and almost 4% higher than in April of this year. But, despite this terrific sales performance, factory production outran retail sales enough to pile up a big glob of inventories at both manufacturing and retail levels.

Obviously this year will be 'way ahead of last in terms of factory *sales*, even if there is a fourth-quarter letdown. Manufacturers' sales in June were almost 20% above June 1952. And July and August surely beat last year, when shipments were affected by the steel strike.

One result of strong sales has been a marked improvement in company profits. In the first six months, corporate profits (after taxes) were at an annual rate of $20.4-billion. This is the best showing since early in 1951. The full year 1953 seems sure to work out as the best profit-wise since 1950, when taxes were much lower.

Profit margins, too, are up a bit. Either as a percentage of sales or as a return on the stockholders' investment, profits in manufacturing are running better than in 1952, according to reports of the Federal Trade Commission.

However, margins are still a good deal lower than they were in the earlier postwar years. And increasing competition is likely to keep them that way. The principal reason for higher profits this year has been higher volume.

Why are unit profit margins so narrow? One reason, of course, is wages—rising all the time. And the cost of industrial materials has been rising, too, reversing last year's trend.

But indirect costs are also cutting into profits. Higher depreciation charges on new plants are cutting down the amount of operating profits that can be considered true earnings. And taxes take more than half of any gain—still more for companies that pay excess profits taxes.

•

Biggest problem ahead is how to maintain profit margins when volume starts to decline. A drop in wage rates or materials prices is unlikely. And depreciation charges will stay high. For many companies, they'll be higher.

There are some obvious ways to cut: Stop overtime, retire inefficient plant and equipment, buy only from lowest-cost suppliers. But most financial experts doubt that these measures will be enough to maintain profits. That's one reason for the soggy stock market.

Best bet would be a real increase in output per worker. The record shows this has seldom happened when volume was on the downgrade. Economists say this year's increase in productivity has been exceptional, won't be matched in '54. But business can make money by proving them wrong.

LOOKING AHEAD IN LABOR

Last minute round-up as we go to press

Struggle for power lies behind ferment within organized labor. Who will be the next Green, Murray, Lewis? Meany or Beck? Reuther or McDonald? In AFL or CIO the story's the same.

Meany and Reuther hold reins in AFL and CIO. But they must yet obtain, and keep, control. Beck and McDonald, strong challengers, flirt with Lewis. It gives them better bargaining position.

•

Big Bill Hutcheson still plays Republican politics. It cost his carpenters membership in AFL.

Hutcheson always got what he wanted from AFL executive council when Green was president. He got it by threatening to quit AFL. He tried it again on issue of AFL-CIO no-raiding agreement. Hoped to show Republicans he still was a power in AFL circles. This time Meany called his bluff.

Executive council elected Dave Beck to fill Hutcheson's seat. But over Meany's protest. Meany had good reason: The machinists, second or third largest AFL union, deserved a place on the council. (Privately Meany finds Beck a threat to his leadership.) A compromise was worked out: Two places were added to the council, making room for Albert Hayes of the machinists, too.

In CIO Dave McDonald has the small CIO unions on his side, would like to play ball with Eisenhower and management. That's why he agreed to serve on President's Commission on Foreign Economics (headed by Inland Steel's Clarence Randall). Reuther was not consulted.

Out of this scramble we expect:

- Meany to emerge as a strong AFL President.
- The carpenters to return to AFL.
- Approval of the AFL-CIO no-raiding pact.
- Further cleanup in teamsters and building trades following suspension of Ryan's longshoremen.
- Slow progress toward AFL-CIO unity, with odds still against it.

•

It's a good bet Taft-Hartley won't be revised even next year. A "draft" of Eisenhower recommendations leaked out of the White House, arousing so much furore it will have to be completely rewritten. Or Congress will go its own way.

As a result of the "leak" episode, the split between labor and management views has widened. Taft-Hartley supporters recoiled when they saw how much the "draft" would weaken the labor law. Opponents, including labor, will be less inclined to compromise the White House thinking.

So it looks like another hot Taft-Hartley fight next session of Congress. And no legislation that would keep Taft-Hartley as an election issue.

"Leak" put Eisenhower in a favorable light in labor's eyes. Seems part of a plan to draw a clear line between Ike and the Republicans who run Congress. This would set the stage for labor to attack Republican candidates next fall while not seeming to attack a popular president.

Note, for example, Secretary Durkin's defense of Eisenhower against the "pattern of plunder" charges of Peter Schoemann, Durkin's stand-in as president of the Plumbers Union. (Durkin did not defend the heavy cut in Labor Dept. funds by Congress.) Note also Reuther's praise of Eisenhower as a man of good "instincts" while he was attacking the Republican record.

•

Copper and aluminum settlements affirmed the "under 10 cents" pattern of wage increases in steel, automobile, and electrical industries.

Coal remained the big question mark. As usual, John L. Lewis kept coal operators puzzled. He delayed beyond Aug. 1 giving 60-day notice of new demands. Lewis bided his time last year, too. Then won biggest prize—$1.90 more a day.

•

Notes off a labor reporter's cuff . . .

- CIO is sponsoring daily newscast by John W. Vandercook over 150 ABC network radio stations, will soon go into TV. AFL started long ago.
- Vested pension rights after 10 years is in UAW-CIO's new contract with Udylite Corp.
- "Rand formula," which let workers stay out of union if they pay dues, is dropped from UAW-CIO's contract with General Motors in Canada. Now all employees must join, and pay.
- Boeing's contract with machinists now "guarantees" eight paid holidays. This year Christmas Eve will replace Fourth of July, which fell on day off.

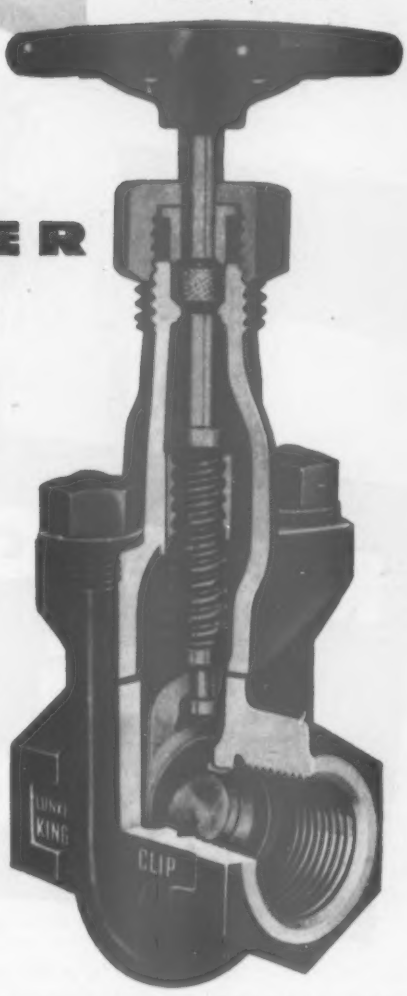
SEE PRACTICAL LABOR RELATIONS, PAGE 246

Tightest gate valve . . . . . you ever used!

the original clip valve with the NEW **non-slip®** *handwheel**

King-clip®

by **LUNKENHEIMER**



It closes tight . . . it stays tight . . . and here are four good reasons why:

The new Non-Slip Handwheel provides a firmer, more comfortable grip for closing—even when the operator's hands are wet or greasy.

The body provides unusual ruggedness—protects the valve against distortion from wrenching or pipe stresses . . . and the steel clip permits quick disassembly and reassembly.

Extra thread length prevents pipe ends from jamming against diaphragm or seat rings to force them out of line. Threads accommodate both A. P. I. and standard threaded pipe.

Stemalloy* stems, in the Iron Body Bronze Mounted patterns, have amazing resistance to thread wear. Millions are in use, and *not one* has ever been returned due to wear failure.

LUNKENHEIMER
QUALITY

BRONZE · IRON · STEEL

Ask your Lunkenheimer Distributor about "King-clip" — the original Lunkenheimer clip valve with cast-in drain channels and a bonnet-thread bushing for perfect stem alignment. For full details, request Circular 561 from your distributor or The Lunkenheimer Company, Box 360-L, Cincinnati 14, Ohio.

*Patented

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THE ONE *Great* NAME IN VALVES

L-753-4

For its new dryer— as for its world-famous washer

NEW MAYTAG AUTOMATIC ELECTRIC CLOTHES DRYER (left) alongside matching Maytag Washer. Dryer uses a condensation principle which prevents lint and moisture from being discharged into the room, has a capacity of 18 lbs. of wet clothes. For safety, the heat, motor and timer turn off and an inside light goes on when door is opened. Texaco lubricants are used in both dryer and washer.

FOR 13 YEARS now, every one of the millions of Maytag Washers produced has left the factory with a Texaco lubricant in its gear case. Performance has been perfect – the best of all possible reasons why important bearings on the new Maytag Dryer should also be Texaco-lubricated.

In The Maytag Company plants at Newton, Iowa, the machines that make these outstanding washers and dryers are also largely lubricated with Texaco.

Texaco Lubrication Engineers work closely with Maytag Engineers to help maintain a steady improvement in product performance . . . to find ways to step up production and bring down unit costs.

Texaco Lubrication Engineering Service can bring these same benefits to *your* plant. Get the facts. Call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

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You're One of 57,000 Bosses

THE LABEL ABOVE gives you a pretty accurate idea of FACTORY's job. Those "bosses" are the 57,000 subscribers who rightly expect good value in return for the hard cash they have paid for their subscriptions to FACTORY.

FACTORY's editors are acutely conscious of their job. We feel we know our bosses well. We see hundreds of them personally every year. We get thousands of letters from them, and write thousands in reply. It's all part of a single, dominant editorial objective — to serve the reader in every possible way — to hit him where he lives — to give him what he wants and needs.

Normally you'd never see anything like the foregoing on the editorial page, or anywhere else in FACTORY, for that matter. But this is an unusual month, and we think talking about FACTORY on the editorial page is in order.

The reason: With this issue, FACTORY acquires a new editor. Harry Lee Waddell, editor for the past four and a half years, moves on to even broader publishing responsibility in McGraw-Hill.

This being so, we think FACTORY's bosses are entitled to know what the new editor is thinking . . .

. . . about those 57,000 bosses — They're the most important men in industry, the plant operating executives who collectively enable the manufacturing plants of America to turn out their products. You can't give savvy men like these what they want if you sit at a desk in a comfortable office.

There never has been any chair-bound editing on FACTORY. There isn't going to be any.

. . . about editorial integrity — Sounds pretty high-flown, doesn't it? Actually, it's not. It's basic. It's the single greatest asset FACTORY ever had or ever will have. It means going to almost endless trouble to check facts, being scrupulously accurate in reporting facts, being rigorous in deciding what to print solely on the basis of its value to the reader.

It's always been this way on FACTORY. We're not going to change now.

. . . about editorial enterprise — This is a sort of fancy way of saying a magazine is on the ball, alert, fast-acting. On a monthly magazine, it takes extraordinary effort to make the editorial content timely, newsworthy, and significant. There's a saying around FACTORY that we manage to do every issue the hard way. That's true, and it's part of enterprise. We often rip out pages at the last minute, to make way for a hotter, more timely article. When we're too late for that we sometimes throw our printers into an uproar with a special insert, plunked into the middle of the magazine.

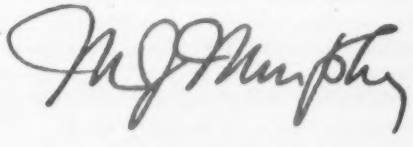
Nobody *makes* FACTORY do such things. But we're going to keep on doing them.

. . . about editorial "leadership" — This is what the whole job really adds up to. You can't just be satisfied to follow others, dragging along in their wake. You have to lead — to spot tomorrow's problems (and solutions) today — and get them into print where they can pay off for your readers.

This is the main goal. FACTORY has achieved it, has truly been the leader in its field.

Will it continue? That's the great challenge facing FACTORY's editorial team today.

The whole team — including the editor — is wholeheartedly dedicated to meeting the challenge.



JAMES M. BLACK • Director of Public Relations
The Associated Industries, Cleveland
tells you

How to Write Better

HOLD ON, MR. BLACK:

"Is a company letter really worth the paper it's written on?"

"Why do you think the letter to employees is a better form of communication than, say, the company newspaper, or the employee financial report? Why couldn't we just put the message on the bulletin board? Name three good reasons why a company letter is so effective."

THREE REASONS? WHY, MR. READER . . .

Here are *six* good reasons for the company letter

1. It's cheap • The letter to employees is a medium of communication that's hard to beat from the standpoint of costs. If it's mimeographed —and most letters to workers are prepared this way—the price is a bargain. One company we know that employs 167 people breaks its letter-writing expense down like this:

Mimeograph operator's time	$2.40
Stamps	$5.01
Paper and envelopes	$2.25

That's under $10. Of course some firms use more elaborate methods to prepare their letters to workers. When they send mail to employees, they "personalize" it. Each individual's name appears in the salutation, and the message looks like it was typed just for him. To do this, companies go to "multitype" or some similar process, and that can cost you anywhere from 70¢ to $1 a page. It's nice, but not strictly necessary. You can still do a tip-top job with a mimeograph machine, simply addressing your letters to "Dear Employee" or maybe "To Members of the XYZ family."

2. It's direct • If you put your message to workers in the company newspaper, it competes for the reader's attention with gossip columns, sports, and general news. Opinion surveys have repeatedly shown that the same facts sent by letter get a much higher readership than they do when presented in the President's Column of the plant journal or on the bulletin board.

And here are answers to the usual objections

"THERE ISN'T ENOUGH TO WRITE ABOUT." Suitable subjects for employee letters are a problem. You may even be told, "Letter writing is all right for big companies, but our plant is small. What do we have to write about that would interest the worker?" Remember, any topic that concerns your employees and their jobs is a possibility for a letter. You have a wide-open field. All you need is enthusiasm, sincerity, imagination, and the willingness to take the necessary time out of your busy day to write to your workers, and to keep writing to them. If you are half-hearted about the program, forget it. It won't work.

"IT'S NONE OF THE EMPLOYEE'S BUSINESS WHAT THE COMPANY DOES, SO WHY TELL 'EM?" Some companies genuinely believe that it's their job to manage, and that it's the employee's job to work. So the company is under no obligation to give workers any of the facts about the business unless it directly concerns them. If you think that way, that's your right. Some companies get along OK (so they say) running their relations with employees in this way.

Well, if that's your philosophy, you aren't interested in employee letters. For they are supposed to bring about the "team-play" and cooperation

Letters to Employees

3. It looks important • If an employee gets a letter from his company, he'll read it. His motives may be varied. Maybe he's only curious. Maybe he feels complimented that some executive thought he was important enough to be sent a letter. Or perhaps he figures that something hot must have popped, otherwise the company wouldn't be writing him. It doesn't matter so much at first *why* he reads the letters. The important thing is that he *does*. The trick is to keep him reading them. And the answer to that one is to make each letter at least *seem* important. And when you come right down to it that shouldn't be too hard to do. After all, during the period of a year, even the smallest company should have three or four things happen that are important enough to write about.

4. It's intimate • The employee letter has the personal touch. It's warm, it's intimate. It goes right into the home of the worker and his family, and it takes the company with it. When management explains a problem that has arisen, it is giving the facts not only to the employee, but to his wife and family. It may even bring about a dinner table discussion, and that's to the good. Moreover it helps the recipient feel that he has had a part in making company policy.

5. It's quick • The employee letter is the fast express of employee communications. The Ohio Gear Company, for example, a Cleveland concern that has every successful letter-writing program, told us that it could get a mail off to its employees in two or three hours, and without straining a bit. Each worker's name and home street number is on a stencil, which permits a fast addressing job.

6. It's informal • There's no make-up problem about employee letters. And there are no rules to which you have to conform in writing them. They fit the personality of the sender; they may be breezy, factual, long, or short, and they may concern any problem of mutual interest to workers and management. Best of all, from the standpoint of the company executive who doubts his literary ability, they do not wholly depend on style for success. The main points on which the result-producing letter are based are: (1) The writer must have something to say that the reader is interested in hearing; (2) he must present the facts, all of the facts, clearly and logically; (3) he must write as one friend to a group of friends, all of whom have a problem in common; (4) he must write as one adult to other adults, not as a teacher explaining a story to first-graders.

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always needed in a democracy to make the human machine tick. And the employee letter is a pretty good brand of oil to keep that machine lubricated.

"WHY WRITE A LETTER? PUT IT IN THE COMPANY NEWSPAPER." When you start talking about writing letters to employees, someone will be sure to ask: "Why not put the story in the plant newspaper, or on the bulletin board? It will save time and money, and accomplish the same thing."

Sure you can do that! And it pays off! But when you have something really important to say, why not give it special emphasis—"the No. 1 treatment"? An employee letter is in itself evidence that you think the topic it covers is significant. After all, you can repeat it in the newspaper or on the bulletin board if you want to. Vital subjects are worth repeating. First, though, you've got to let people know you think the subject is vital.

"THE UNION WON'T LIKE IT." This is last but not least. Practically every company official who decides to start a letter-writing program is told that labor won't like it if the company sends mail to members of the union.

Chances are, this is 100% true. But the answer to his objection is easy:

You're not sending letters to the union's members, but to your employees.

You're not writing *against* the union, but *about* the company.

Now, then, why won't the union like your let-

ters to employees? That obvious. It's in the propaganda business itself, and doesn't like competition. The union knows that the more employees know about you and your business, the harder it will be to lead them blindly. The members might even begin to ask embarrassing questions.

We suggest that you tell your supervisors about your plan and let them know what you expect to accomplish by it. It might even be a good idea to inform the union of your intentions. But if you do decide to tell the president of the local about your project, *tell him; don't argue with him.*

What You Can Write About

1. Competitors · What do your people know about your competitors? Are they conscious of the companies producing your type of product and bidding for your customers? Or do they work in a vacuum? If you make your rivals come alive through your letters you will build a spirit of competition in your workforce. If they understand that ABC Corporation is turning out a better product at a lower cost and taking your customers away, they'll begin to hit the ball. After all, it's their dinner plate at stake. Besides, people do better when they know the score.

2. Contract Negotiations · Many companies send a letter to workers after a contract with the union has been signed. The president has a chance to explain the terms of the new agreement and at the same time get across the idea that the company is sincerely interested in the employee's welfare. It's a chance to say that the company "gave"—not, as is so often thought, that the union "won."

3. Customers · Does the man on the punch press helping turn out a job for XYZ Company understand that it's his responsibility to see that the customer is satisfied with the product? Does he know that *his* job and *your* job depend on the organization's ability to keep the buyer coming back for more? Letters from you introducing the employee to the customers will probably make him take a greater interest in his work.

4. Economics · Every company has a stake in America's system of private initiative or free enterprise. By explaining the economics of your business you are also explaining how this system operates. If you can show that high production costs are pushing you out of the market, your line staff has a better chance of selling employees on technological improvements. Economics would also cover the effect of high taxes, problems of controls, and relationship of prices and wages.

5. Employee Benefits · This is a tie-in with economics. But industry spends about 30¢ an hour over and above wages for employee benefits like insurance, holidays, vacations, pensions. Smart management tells this story. That way the employee knows that his pay check is far more valuable than the amount of money he actually takes home. If you can get your workers thinking in terms of earned pay, not take-home pay, they might have something to say to the government about the present tax situation.

6. Future Business Prospects · Employees are always interested in the future of their company. It's their future. They want to know what you expect the coming months to bring in a business way. A letter on this subject at the beginning of a new year or a new business quarter is appropriate.

7. Industrial Relations Laws · When Congress or your state legislature passes a law that concerns the management-worker relationship, it's a good idea to explain to your people exactly what it will mean to them personally. Your letter is the medium to use. If there will be changes in the way you do things because of the new statute, discuss them frankly and explain what they will involve as clearly as possible.

8. Methods · Suppose you install a merit rating system, a job evaluation plan, or bring in new machinery that will require that present jobs for a department, say, have to be restudied. A letter from you to the employees explaining exactly *what* you are doing and *why* may win their cooperation. Be sure to point out how the plan will benefit them and the company.

9. New Machinery · In the employee's mind, new machinery may be a threat to his job. If you can explain that it will increase efficiency, reduce manufacturing costs, make the company more competitive, and actually increase the employee's job security, you will eliminate possible rumors before tney even get started.

10. New Plant · When a company buys a new plant or builds one in another city—or even in the same town — everyone is curious. People wonder how it will affect them, wonder if management intends to cut down local operations. A letter telling about the new plant and the part it will play in the

organization as a whole will "fact" the fiction that may be going around the plant.

11. Policy Revisions · When management changes or revises a policy that affects employees, it is a good idea to explain why. When people understand the reason that a practice exists, they understand better the policy that it stems from. Policies should be real and meaningful in the eyes of employees, not just arbitary rules.

12. Purely Personal · Suppose an employee turns in a suggestion that saves the company a lot of money. Suppose a department breaks a production record. Why not a letter to the entire force telling them about it? Of course, they may know already. That doesn't matter. What does matter is that they know you know and are pleased. It's a morale booster to anybody when his boss praises his work.

13. Sales · When a big order from a new customer comes in and the shop is busily getting ready to produce it, a timely letter on "sales" is a natural. The new order provides a perfect springboard. You can take it from there, discuss sales in general, and show how the fellow who sees the customer keeps the shop humming. The importance of sales should be real to the man at the machine, not remote, a thing apart. When everybody understands the urgency of the other fellow's job and how all jobs tie in together, you get teamwork.

14. Company History · You want your company to be a real and living thing to your employees. You want it to have their loyalty. Why not a letter from time to time about the people who helped build it? Not just "top brass." Maybe there was an old toolmaker 25 years ago who came up with an idea that you're still using. What was he like? It's fun to reminisce—and your workers will like it.

15. Special Occasions · Christmas, New Year's, Thanksgiving are holidays of goodwill. They are occasions when many a company president sits down and writes a friendly letter to employees. You may be missing a bet if you give this the go-by. Some top executives even drop pleasant little personal notes to workers on their birthdays or when there is a new arrival in the family. It's a chore, admittedly. But these men say it pays off.

16. Times of Trouble · From time to time trouble occurs in any plant's industrial relations program. When the union turns down your best offer in contract negotiations, and a strike looks imminent, you can reach your workers by mail with the company side of the story. Maybe the union hasn't given them all the facts. Maybe when your letter to them draws the full picture they will force their bargaining committee to come to terms. It has worked before. Even if they are home on a work stoppage, your letters can reach them and perhaps start a back-to-work movement. This is especially true if over the years they have become accustomed to hearing from you and have learned that you always deal in facts.

What Six Companies Say About Letters to Employees

COMPANY 1 · We started our letter-writing program three years ago. Once, when we were confronted with a pricing problem, we took it to our employees by mail. We listed our product prices, and reported competitors' prices for similar items. We followed this up by putting the same data on the bulletin boards. The reaction was good. We were able to get an incentive system installed in our next contract negotiation. We trace it to the effect of the letter.

COMPANY 2 · We began our letter-writing program in 1948, and we write about six letters a year to our people. The president usually signs them. He discusses every sort of subject from the business outlook to the need for giving blood to the Red Cross. The effect has been good. When other executives realized that the employee letter was the "Old Man's" baby, they fell into line on employee relations. It's made my work as personnel director easier.

COMPANY 3 · For three or four years we have been pounding economic facts into our employees. Last year when the international union wanted to take our people out on strike because we wouldn't meet a demand that headquarters was trying to establish as standard, we explained the situation to our workers by letter. Result: The local overruled the international. No strike. Our years of work had done the trick.

COMPANY 4 · We had a problem in tardiness. But when we brought it to the attention of the employees by a letter, they helped us solve it. We proved to them that when a man was late or absent he was hurting everybody in the pocketbook—not just himself. The results are good.

COMPANY 5 · We even have a special letter that we send to foremen and supervisors. Information about the company gives employees—hourly or salaried—a knowledge of the business. Furthermore, the employee letter is good insulation against rumor and false propaganda.

COMPANY 6 · Our company discusses all phases of its business with the workers. They appreciate it and like it. How do we know? They tell us so. They come up to foremen and other management people and say they were glad to hear from the company.

For sixteen tips on how to write to employees, turn the page

LETTERS . . . *Begins on page 84*

Sixteen Tips On Writing to

1 **BE YOURSELF** • Write like you talk. If you use a ghost writer, make sure the copy he prepares for your signature expresses your personality. And says what you want to say the way you want to say it. Your employees know you. They can tell when it's you talking.

2 **MAIL THE LETTER** to the employee's home. Address the envelope to Mr. *and Mrs.* Joe Worker. The wife has a tremendous influence on her husband's opinion. You want her to read your letter. You want her to understand management's point of view, and your point of view. You want her on your side.

3 **SALUTATION?** Up to you. If you normally call the men in your shop "Bill," "Tom," "Joe," that's what you should call them when you write to them. But, if you are naturally aloof and formal, use the surname and prefix it with a "Mr." In other words, stay in character. Don't be chummy on paper if you are naturally reserved.

4 **PERSONALIZE YOUR LETTER** • You can supply a letter writing service with a list of the names of your employees, and it will individualize your message. This costs more. But it may be worth it. It makes the man on the "reading" end feel that your letter is intimate and exclusive. If you think the multityping process is too expensive, it's better to use a group salutation—i.e., "Dear Employee," "To a Member of the XYZ Company Family"—than it is to mimeograph your copy, and then type in individual names at the top. The difference in print is immediately apparent, and it has a bad psychological effect. Why? It's an obvious subterfuge. People won't mind getting a straightforward blanket letter from you. But it may be annoying if you dress up a circular in a transparent disguise.

5 **THE WIFE'S NAME** • You needn't include the employee's wife's name in the salutation of your letter. Just make certain that it's on the envelope. That makes sure she opens it. And it will probably come when the husband is at work. Of course, it doesn't hurt to add the wife's name to your opening if you want to. But it may complicate your task.

6 **WRITE REGULARLY** • There are plenty of things — and important things — that you can write about. Don't wait until there is a crisis. If you write your people letters at regular intervals, and discuss the various phases of your business with them, they get used to hearing from you, and begin to expect the mailman. Then, when there is union trouble, or a strike threatens, you have an established and personal means of getting in prompt touch. In fact, they will want you to.

Certainly, if you have explained why you bought a new piece of machinery, remarked on business conditions, pointed out the feature of a new insurance program you were installing in past letters to employees, they will want to hear what you think about a situation that concerns their jobs. But if you only write when the workforce is about to "hit the bricks," they may be suspicious of your motives and believe that your letters come only when you want something from them. There are many managements that say the president of a company should just write employee letters when he has something important to say—that too many letters make them commonplace. But then it shouldn't be too difficult for you to find a worthwhile and interesting topic every few months.

7 **HOW LONG?** Don't worry about the length of your letter. Say what you have got to say, whether it takes one page or five. Don't think that people won't read anything that's longer than a page. A research organization that did an extensive survey on management letters learned that a 9-page letter from the president of a metal manufacturing plant on management's position during a contract negotiation had a higher readership than any others that were checked. Of course, you shouldn't pad. But don't leave out important facts for the sake of brevity.

8 **PRESENT THE FACTS** just as you see them. And be doubly certain they are "facts." Have your staff check any situation you plan to discuss to be sure it is exactly like you say it is.

If, through faulty information, you declare something is so, and the employees through personal observation know it isn't so, you do more damage than good by your letter. People are quick to pick up errors, even when they are trivial. An author who once wrote that Atlanta was farther south than Charleston, S.C., got many written reminders from his readers of his mistake. In fact, an error, even if it is inconsequential and has no bearing on the topic being discussed, is likely to be such a "scene stealer" that it is the only thing that is remembered afterward.

9 **WRITING STYLE** • If you write your letters personally, don't be too concerned about your

Employees

prose. The idea is to get your message over. Short, concise sentences are what you want. Your employees don't necessarily expect you to be a polished writer. But they do expect you to be able to make a logical, coherent report.

10 **DON'T WRITE "DOWN"** • And don't underrate the intelligence of your workers. If the word you want to use has more than two syllables, you needn't be afraid of it. The reader probably knows what you are talking about from the context even if he doesn't know the exact definition. And nobody likes to think that the estimate placed on his intelligence is so low that he isn't expected to grasp any idea not expressed in the language of "The little red hen found a wheat seed."

11 **GRAMMAR?** Don't worry too much about it. It's all right to sometimes split an infinitive (same as me) and use a preposition to end a sentence with.

12 **MAKE YOUR LETTERS FRIENDLY** • But don't be overfriendly.

13 **NEVER BE VAGUE** • Workers are always trying to read between the lines, anyhow. And if you make a statement that can be taken two ways, it will probably be taken five ways. If you don't know the answer to a question you understand is on the employee's mind, say so frankly. Don't beat around the bush.

14 **DON'T BE CHEERILY OPTIMISTIC** if you have good reason to believe your optimism is unwarranted. Your workers may plan ahead on the basis of your letters. If they get a letter from you about how rosy the prospects are, and then two months later there is a lay-off, you've hurt yourself in their eyes.

15 **ALWAYS TELL THE EXACT STORY** • Don't try to hide things. It's better to ignore a situation altogether than to try to gloss over it.

16 **BE SINCERE** • Your employees may not always agree with your point of view. But, if they are convinced of your integrity, they will respect it. If you have the reputation among your workforce of shooting square, and calling each pitch as you see it, you'll be surprised at the good you can accomplish through your letters. They are the quickest, the best, and the most personal means of communications you have. Use them!

Who Should Write to Employees

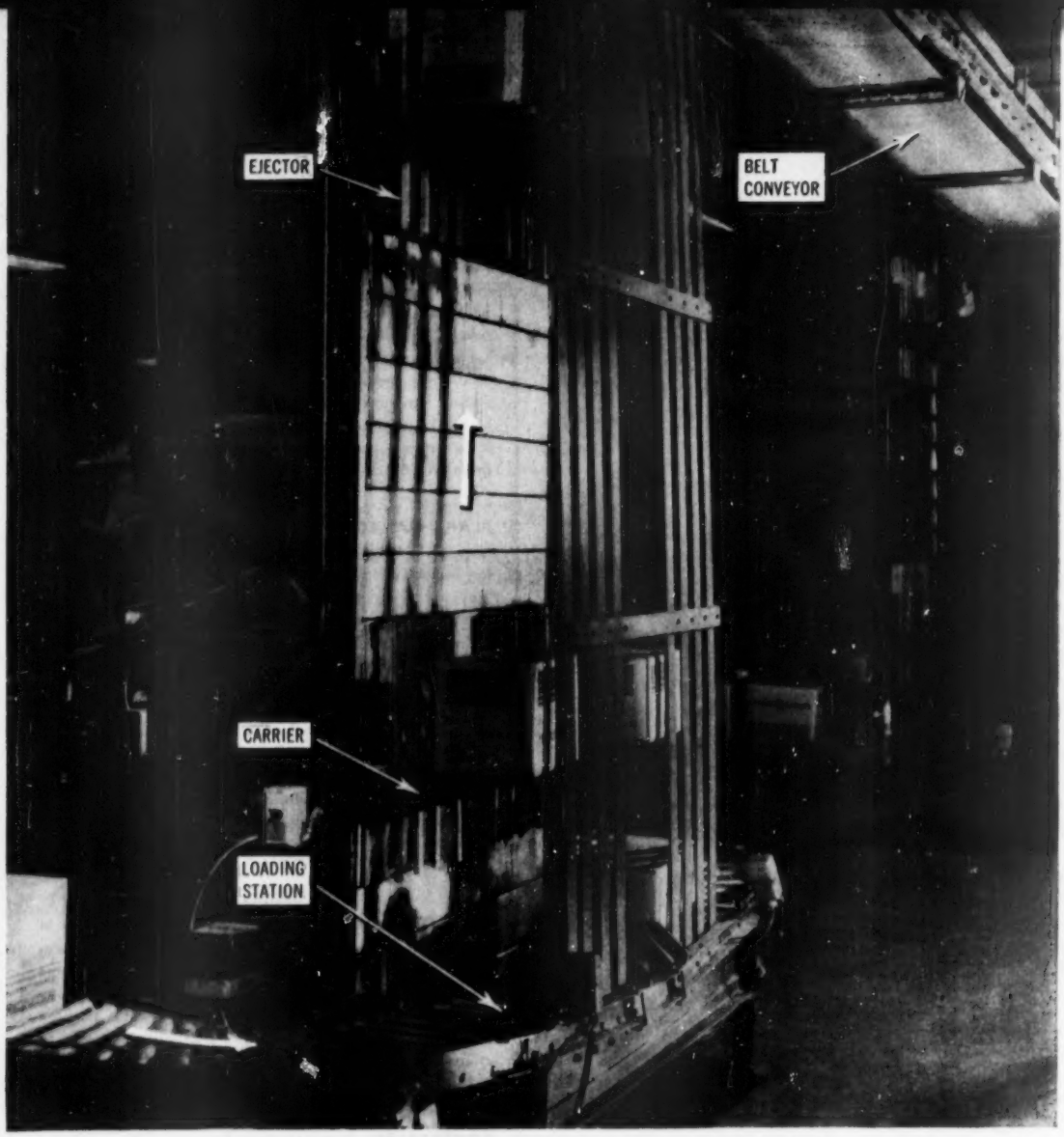
PRESIDENT ... because he is the voice of the company. He can write on any subject — with authority. His is the final word. The mood of his mail to workers is instantly reflected in their attitude. For that reason he should be as certain to write to them when things are going well as when they are not. One more thing! The entire letter-writing program depends on the president's backing. If he thinks it's worth the effort, other executives will, too. If he's simply passive or negative in his opinion, the program will break down.

PLANT MANAGER ... because he is boss of the shop. He's usually the one top management executive that all the factory people know personally. Frequently they figure they work for him. So he's an ideal man to use in your letter-writing program. He can write about production problems; why there should be a greater effort made to control scrap; why a new machine has been purchased and what it will do; why there is a need to change methods or to introduce new material. And he can write in such a way that it will stick. Employees know he's not talking theory. Moreover, since he knows the people personally, they regard it as genuine when he drops them a note praising a certain department or individual for doing an outstanding job. The praise of a top sergeant often means more to a soldier than an award from a general.

INDUSTRIAL RELATIONS MAN ... because he is in direct charge of personnel policy and affairs. Announcements of changes in industrial relations procedure come from his office. He is usually the man who keeps an eye on what goes into the plant newspaper, what goes on the company bulletin board. The possibilities he has to utilize the employee letter — and to make it an important instrument of employee communications — are unlimited.

CONTROLLER ... because the finances of the company are of vital significance to the man in the shop. Each year he reports on the economic progress of the firm in which they have invested their money. The employee invests his time and his future in the company. He's interested, too. His job, his security, and his hope for tomorrow depend on the prosperity of his plant. So a friendly letter from the controller that outlines the highlights of the stockholders' report should have a good effect.

SALES MANAGER ... because people in the plant should be vitally interested in the sales phase of the firm's activities. If they are informed when a new account has been secured, it will give them a greater sense of satisfaction. If they are told why a certain customer had taken his business elsewhere, they might come up with some ideas that would help win him back. Certainly the salesman's notations on the strong and weak points of a company's products should be of more than passing interest to the men and women who make them.

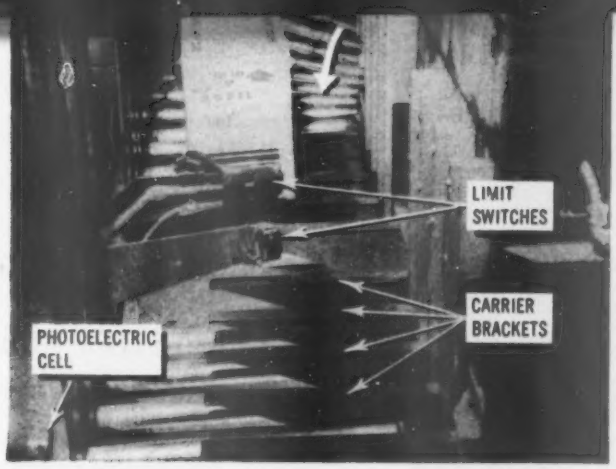


1 **VERTICAL ARM CONVEYOR** is key link in continuous flow from assembly to warehouse. There are three, each serving two assembly lines. Short curved sections of gravity roller conveyor bring cartons to loading station. Carrier arms then lift them 10 feet, eject them onto overhead powered belt. Limit switches—one master, two slaves—synchronize conveyors to prevent interference on overhead belt. Vertical conveyor belt is made of 4-ft.x6-in. steel sections. A ½-hp. motor drives each conveyor 30% faster than assembly to avoid accumulations.

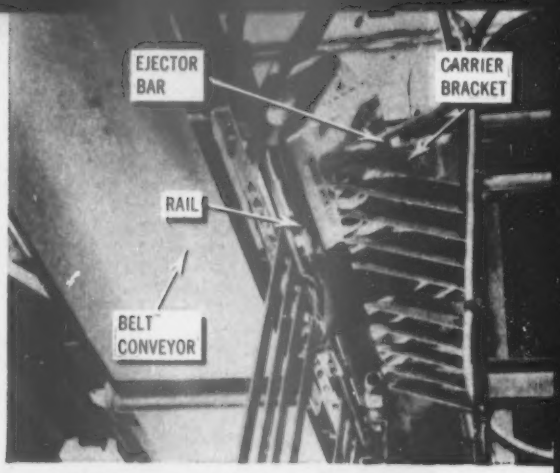
At General Electric Company, Utica, N. Y.

Automatic Conveyors Bridge Handling Gap

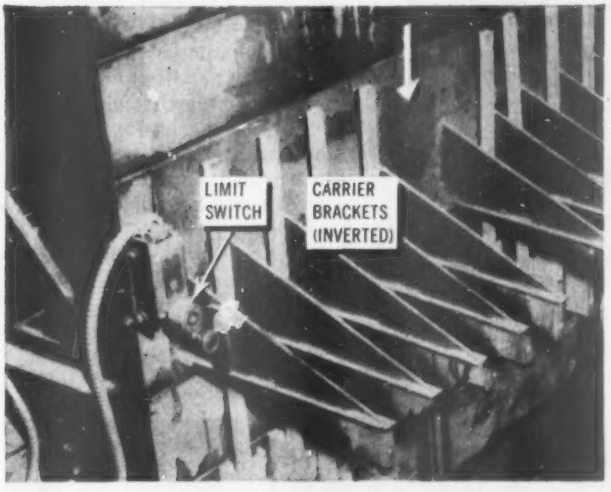
THE PAUSE IN CONTINUOUS FLOW between assembly and storage is no longer considered inevitable. Case in point is at General Electric's radio receiver plant in Utica, N. Y., where the gap has now been closed. Non-stop flow via a new conveyor system



2 LOADING STATION of vertical conveyor is series of level rollers supported from one end so vertical carrier arms pass between. Carton approaching loading station cuts light beam of a pair of photoelectric cells. If rising carrier arms are in position to catch only end of carton, break in beam stops conveyor. When carton fully enters loading station, it strikes limit switch that starts conveyor again. Conveyor doesn't stop if carrier is far enough below rollers to allow carton to enter station.



3 AUTOMATIC EJECTOR tips cartons over rail onto overhead belt. Ejector bars are attached to vertical belt above carriers. When belt curves over head of conveyor, the bars swing out, tip carton off carrier. Slight drop to resilient belt doesn't harm well-packaged radio. Belt conveyor, 10 feet above the floor, moves cartons to the warehouse.



4 INTERLOCKED LIMIT SWITCHES (to keep vertical conveyors synchronized) are on return side. Carrier arms trip them. No. 1 conveyor is the master, No. 2 and No. 3 are slaves. If conveyor 2 or conveyor 3 gets ahead of conveyor 1, its carrier arms trip limit switch to stop it until conveyor 1 catches up. All conveyors eject cartons onto the overhead belt simultaneously. With synchronization, distance between conveyors prevents pile-ups.

5 OVERHEAD BELT CONVEYOR, 18 inches wide, carries cartons 125 feet to warehouse (through openings in wall and two other departments). Conveyor is powered because of limited ceiling height. As belt enters warehouse, it transfers cartons to gravity roller conveyor that carries them to the palletizing area.

has replaced a stop-and-go "batching" method of moving pallet loads of packaged radios.

OLD WAY • Following final inspection, radios were packaged. Cartons were manually closed and sealed, and placed on pallets for truck transfer to warehouse. The ends of the six assembly lines came too close to a bearing wall to allow more than one pallet load of production to accumulate. If loads weren't removed promptly, production had to wait.

NEW WAY • It consists of a continuous conveyor system (cost $13,400) which was designed and installed by Kornylak Engineering Company, Jersey City. The new system is now just about two years old. It has passed through the "debugging" stage. It is saving the company both time and money. Witness these benefits:

- Conveyor cost returned the first year.
- A serious production bottleneck eliminated.
- Hazardous congestion removed.

Turn the page

Begins on page 90

6 **GRAVITY ROLLER CONVEYOR** feeds cartons to the palletizing area. Here it's waist high for easy handling. Handlers select radios of one model for each row of pallets, stack them for storage. Segregation provides visible inventory.

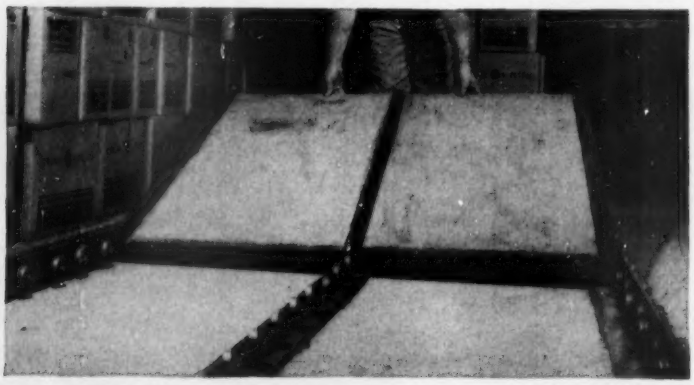
Stock Turnover Is Automatic, Too

The concept of continuous flow applies to warehouse and shipping, too. Only difference is, transfers of cartons into and out of storage aren't automatic. But first-in, first-out inventory turnover *is* automatic.

As radios come into the warehouse via gravity conveyor, handlers take them off and stack them on plywood pallets, placed a couple of steps away on skate-wheel conveyors. Different models go on different pallets.

When a pallet is filled with one model, the handler pushes it on the conveyor to the shipping side of the warehouse. He places another pallet on the conveyor and fills it with the same model. Each row of palletized radios contains just one model.

When shipped, radios are removed from storage on the side of the warehouse opposite palletizing. Thus radios first in are first out—without records.



7 **SKATE-WHEEL CONVEYORS** set stored stock on wheels. Angle-iron conveyor rails are bolted to concrete floor. Plywood pallets are protected by steel strips from contact with wheels. Slight push sends loaded pallets across warehouse.

8 **SHIPPING CONVEYOR** transfers cartons from storage to truck docks. There are three belts, one for each dock. Automatically, the first radios into storage are first out. From belts, cartons move via portable gravity conveyors into truck.

WATER-SPRAY TEST shows the kind of bad-weather conditions motors will stand when treated with Thermalastic insulation.

Tough operating conditions can be licked by . . .

New Idea for Protecting Large Motors

By M. R. LORY • Manager, Motor Section, and G. L. MOSES • Manager, Development Insulation Section, Westinghouse Electric Corporation, East Pittsburgh

WHY IT'S IMPORTANT • Do any of your large motors get the same treatment as the motor shown in the photograph?

Probably not—if they're installed indoors. But today more and more large motors are being installed outdoors, or in semi-enclosed structures where the weather can get at them. And many companies have to weigh the high cost of weatherproof motors against the high cost of putting up a building to protect regular motors.

Real problem has been with motor windings. Large motors are usually operated on 2300 or 4160 volts. This higher voltage added to the insulation problems of the winding. That is, until Westinghouse decided to try using Thermalastic insulation on large motor windings.

WHAT IT IS • Thermalastic is basically a mica insulation. Large mica splittings are bonded into a tape or a wrapper with a strong, resilient synthetic resin. The wound coil is then vacuum impregnated with this heat-reactive, solventless resin, and cured in an oven.

This insulation has been in use on turbine-generators and large waterwheel generators since 1949. Its success under these conditions of operations made it a natural for application to large motors operating under similar adverse conditions.

WHAT IT WILL DO • A test of Thermalastic insulation's resistance to moisture is shown in the photo (left). The motor on test is an open-type, 950-hp., 4160-volt, squirrel cage motor running at normal voltage while water is sprayed into the inlet openings. Following the spraying, the coils withstood 1.7 times the normal line-to-line voltage applied between the winding and the motor frame.

In another test, more than 200,000 gallons of water was poured over the windings during a period of 275 hours. The same test was made with another motor winding of standard class "B" insulation. Both motors had insulation resistance values of 6000 megohms at the start.

At the end of the 275 hours of water treatment, the standard insulation had dropped to 0.3 megohms, which would have necessitated its removal from service. The windings treated with Thermalastic still showed 1 megohm and had remained at that figure for over 50 hours. According to standards in most plants, the motor could have remained in operation. What's more, it was found that water had penetrated the regular insulation, but not the Thermalastic insulation.

WHAT IT PROMISES • Chief advantage of Thermalastic insulation is its great resistance to moisture, dirt, oil, acids, and alkalis. It has been used on motors in rubber mills that are subject to lampblack contamination, and steel mill drives where the motors are subjected to water sprays and steam. Chemical plants have used it on motors operating in severe acid conditions. No failures have been experienced in one and one-half years.

HOW TO GET IT • At present, not all motors can be built with this type of insulation. Manufacturing facilities have restricted its use to motors for severe applications. Its cost may rule it out for smaller motors for some time in the future.

It is expected that in the near future Westinghouse will apply Thermalastic insulation to all large motors of approximately 500 horsepower and above.

IDEAS OF THE MONTH for

By LEWIS K. URQUHART • Managing Editor, FACTORY

DEXANGLE — we'd like to remind you again—has a host of uses around the shop. Machine guards, shelving, bins, partitions, etc., etc. A hack saw and a wrench are the only tools you need to assemble it. Acme Steel Co. (2840 Archer Ave., Chicago 8) sells it by the package. Each package contains ten 10-ft. lengths of slotted-leg galvanized steel angles and 75 bolts and nuts.

PLASTIC BINDING is the ideal way to assemble standard practice instruction sheets, manuals, etc. And General Binding Co. (57 E. Jackson Blvd., Chicago 4) has a new desk-top unit called PB-5 Combo that punches and binds on the same machine. All at much lower cost than ever before possible.

LAYOUT PROBLEMS? We recommend "Modern Methods for Plant Layouts," which you can get from F. Ward Harman Associates, Halesite, N. Y. Describes the Harman "Temprint" method of making and reproducing two-dimensional layouts. Also the Harman line of scale models. Remarkable for their accuracy of detail. Instantly identifiable.

BETTER NOT PLAN FACTORY OFFICES till you've seen El-Units, Art Metal Construction Co.'s entry in the functional work station field — a full line of work tops and filing cabinets that can be combined to fit any need. AM's address is Jamestown, N. Y.

CALIBRATED WIRE ROPE — marked in colored bands at 5-ft intervals — will look good to plant men who've tried to unreel and measure lengths by hand. Paulsen-Webber Cordage Corp., 170 John St., New York.

FLAMEPROOFED CLOTHING of lightweight cotton has played a big part in the wonderful safety record hung up at J & L's Pittsburgh Works — where the average annual rate of body burn cases has dropped 88% over the past 5 years! Instead of the traditional asbestos safety suit for close-up work around its open-hearth furnaces, J & L is using a Permaproofed jacket with an aluminum-foil inner lining that reflects as much as 80% of the heat away from the human body. For info about Permaproof write Treesdale Labs & Textile Processing Co., Pittsburgh.

TABLES AND BENCHES that fold up and lock into a caster-equipped truck look mighty handy to us. Mobil-Fold (Shieber Sales Co., Detroit 23) consists of two 14-ft. tables and four benches. Room for 32 adults. Tubular steel understructures. Heat-resistant plastic tops.

SLIDERULE OF THE MONTH (and a Jim dandy) is obviously the calculator offered by Young Radiator Co., Racine, to help you select shell-and-tube type heat exchangers. Gives you square feet of surface necessary to transfer a given amount of heat between oil and water on the shell side and water on the tube side. Price $2.50 — but it's "available on request" through Young salesmen.

Factory Executives

BULLET-PROOF APRONS will be worn this fall by well-dressed machine tool operators. At Lockheed anyway. Better investigate. Details on page 222.

BOOKLET OF THE MONTH is Dow Corning's "Tall Tales and Fabulous Facts." The Tall Tales bring back memories of such delightful characters as Paul Bunyan, Davy Crockett, and Johnny Appleseed. The Fabulous Facts (about silicones) demonstrate that today's tallest tales are written in industry's labs. Write Dow-Corning Corp., Midland, Mich.

PROFESSIONAL LETTERING is a cinch. Even a novice can do it. With Varigraph templets, that is. Perfect for the lettering jobs and signs that every plant has to truck with. You'll be amazed at the variety of type faces available. And only one templet in each style is needed to make some 500 variations in either height or width of letter. Templets cost $8 to $14 a piece; a lettering instrument, $98.50. The Varigraph Co., Inc., Madison 1, Wis.

COUNT-KWIK is a two-compartment transparent plastic change box that fits most petty cash boxes or drawers. 3½ x 6½ x 1½ inches. Five curved sections in bottom compartment, each accommodating a different size coin, hold up to $21; removable top compartment is large enough to hold up to 30 bills laid flat. $3.50. Mosler Safe Co., Hamilton, Ohio.

SIGNS ON YOUR PLANT tell the world who you are, what you make. And the porcelain enamel kind need only an occasional washing with soap and water. Ingram-Richardson Mfg. Co., Beaver Falls, Pa.

WORK SAVING WEEK (an annual November event) is worth looking into by anyone who feels the urge to improve methods and increase production and is looking for a good way to do same. Write Work Saving International, c/o American University, 1901 F St., N.W., Washington 6.

TAKE LOTS OF PHOTOS? Then you'll want a copy of Eastman's new 20-page leaflet. It's free. Write Sales Service Div., Eastman Kodak Co., Rochester 4. Ask for "Filing Negatives and Transparencies."

PLASTIC AISLE MARKERS (W. H. Brady Co., 727 W. Glendale Ave., Milwaukee 12) give you a dotted line that really shows up. Self-adhesive, highly resistant to abrasion. Only .005" thick, to lie flush with the floor. Stocked in yellow, red, green, white. Cost less than paint.

SHEET SAMPLER that ought to go big in a lot of plants has been perfected by a couple of Australian engineers. They developed it to take samples from thin sheets of material moving at high speeds over rollers. Paper, plastic, textiles, metals. It's a gun that shoots a cutter through the material. Samples are nice and clean and round. For info, address Australian Paper Manufacturers Ltd., Melbourne.

EVERYBODY AT HERCULES POWDER COMPANY

IT'S UNION'S RESPONSIBILITY to make sure task exam given by foreman (right) meets union standards and is fair test of trainee's ability. Here, journeyman (left) acts as witness.

IT'S TRAINEE'S RESPONSIBILITY to pass five task exams every six months. He must also attend night school at least once a week, study at home, and keep his own training records.

Now—the "Perfect Training Plan" for

Here's what's unusual about it...

• **Tests are built right into on-the-job training.** Same job breakdowns used in teaching are used as tests.

• **No trouble satisfying everybody with promotions.** That's built right into the program, too. All trainees make top-rated journeymen in four years if they've met program standards. Pay increases every six months, too, if work is satisfactory.

• **Simple records kept weekly by trainees and tallied by the training department keep management up to date on progress.** And with a minimum of paperwork for the foremen.

• **No hard feelings if trainee "flunks out."** Both union and trainee understand that more than one failure in any six-month training period means transfer from the program.

• **Off-the-job training at vocational school stresses specific needs of the plant.** School staff members make frequent trips to the plant in preparation of course material.

• **Union is "included in" on all phases of the apprentice training program.**

• **Initial installation took only one man and a secretary full time.** Now needed only part time.

...And here's the pay-off

After two full years of operating the program, the company reports:

69 GRADUATES • All first-class mechanics. And 41 more men now under instruction. Every promotion is based strictly on demonstrated ability in a planned course of work and study.

Before the plan . . . seniority, rather than ability, generally guided promotions.

MORALE IMPROVED • Every employee now knows he will get the chance to be a top-rated mechanic if he has the ability. Openings in the training program are posted throughout the plant. Any top senior qualified man can take the entrance tests required for acceptance into the program.

GRIEVANCES ELIMINATED • There hasn't been a single grievance covering the training program since it was installed. And no grievances on working out of classification, either. All members of the maintenance force, whether trainees or journeymen, can be assigned any work in their own craft.

Before the plan . . . plant used to have three grades of mechanics plus helpers. If a "B" man was assigned to questionable "A" work, he usually

PITCHES IN TO MAKE TRAINING PROGRAM WORK

IT'S SUPERVISION'S RESPONSIBILITY to help train workers, or to detail a journeyman to do it. Foremen also schedule jobs so that each trainee gets wide range of experience.

IT'S SCHOOL'S RESPONSIBILITY to keep classroom material geared to specific plant needs. Here school instructor and shop foreman put their heads together to plan night school lesson.

Maintenance Apprentices

It's at Hercules Powder Company's Parlin, N. J., plant

demanded to be detailed to the job at the "A" rate. If not detailed, a grievance was often filed on the grounds that the man was working out of classification. At the time the training program was installed, there were so many such grievances that management was just about ready to do away with an entire grade classification.

JOB JEALOUSY DIMINISHED • It's a common sight to see a trainee doing a job with the journeyman acting as advisor. A journeyman now takes a particular interest in spreading knowledge of his craft. He knows the trainee is not working to replace him, but is rather a full partner in getting a job done.

FAVORITISM CHARGES DROPPED • Pay increases now depend entirely on the ability of the worker. Exit the cry of favoritism. Pay increases are earned on schedule, and there's no need for the junior man to wait for his senior to be promoted.

HUMAN RELATIONS IMPROVED • Especially between the foreman and his men. Foremen have become more counselors and instructors, less bosses. And now the entire supervisory force considers attention to training matters a daily routine.

CRAFTSMEN ASSURED • The plant needs and gets mechanics who are truly masters of their craft, not just experts in some phases of it. Records of on-the-job training show exactly where the trainee has spent each of the 8000 hours of his apprenticeship. So if a trainee's record shows his experience in an area to be weak, management can schedule work there to strengthen it.

EMPLOYEE SKILLS KNOWN • Management knows exactly what to expect of a trainee at any stage of the training program. Same records indicate exactly how many hours a man has spent on each phase of his craft, and test results show exactly how well he has done.

UNION PARTICIPATION BROADENED • The union has, in effect, become a salesman for training in the plant. And it has lent constructive criticism and suggestions to improve course material and testing procedures.

What does it take to run a program like this? We asked Dave Hill and Bill Edwards of the Hercules training department. For what they have to say, turn the page.

Begins on page 96

What It Takes to Train Maintenance Apprentices "the Hercules Way"

By DAVID W. HILL • Training Supervisor, and
WILLIAM O. EDWARDS, Assistant Training Supervisor
Hercules Powder Company, Parlin, N. J.

WHEN WE INSTALLED the Hercules training program in February, 1951, these were the ground rules we set up for each of the three classifications of mechanics and their helpers:

• All "A" mechanics were excused from apprentice training.

• All "B" mechanics who entered the program would get a year of training before promotion to "A" mechanics.

• All "C" mechanics would get two years of training before becoming journeymen.

• All helpers with a year or more of experience would train three years before reaching the journeyman level. That got rid of the troublesome "helper" classification.

• Any new members joining the maintenance department would have to take four full years of training before becoming journeymen. Exception to the four-year requirement was made in the case of painters and riggers. They train for three years.

Everyone in the maintenance department filled out a "statement of choice" form indicating whether he did or did not wish to enter the program.

If he did not wish to enter, he simply stated so in the form—that he wanted instead to remain in the department at the rate currently held, with no chance of advancement.

If he wished to change his mind, he was given a year to do so and then enter the program. After a year, the opportunity was withdrawn.

How we pick trainees

Openings for maintenance trainees are posted throughout the plant for seven days so that all employees can bid for the job. The top senior qualified man is selected to take entrance tests, which he must pass in order to be accepted.

Selection is by both tests and interviews to assure minimum failures in later training stages. We use:

• **The Bennett Test** of Mechanical Comprehension.

• **The Schorling-Clark-Potter** Hundred-Problem Arithmetic Test.

• **Interviews** to establish emotional stability, maturity, and personality qualifications.

After a man is accepted

The four-year Hercules course is divided into eight six-month sessions. During each six-month period, the trainee's major responsibilities are to pass the five "task-performance tests" on the job, and to contribute his own time to night school and home study.

The tests • They are actually built into the training program. Each task is a series of operations in a job breakdown. There's a test on each of 40 tasks. They begin with the simpler responsibilities and continue with increasing difficulty until by the fourth year the trainee is doing mostly journeyman work.

Typical tasks were selected in each craft on two points: the frequency with which they occurred in daily maintenance work and the wide range of skill needed by the trainee to pass any individual test on them.

How tests are given • They're administered by the shop foreman and witnessed by a union journeyman representative. The foreman is the sole judge as to whether the trainee performs the test successfully. The journeyman witness attests that the task is performed to union requirements, and that it is a fair test of the trainee's ability. (*For free samples from Hercules' training manual illustrating typical tasks and tests, address The Editor, FACTORY, 330 West 42nd St., New York 36.*)

Night school instruction • Trainees must attend one of the Middlesex County Vocational and Technical High Schools at least one night a week. They can attend additional nights in order to "bank" hours against possible future absenteeism. During the nine-month school year from September to May, they're required to complete approximately ten lessons a month. Minimum passing grade on all is 70.

Although at least one night a week is spent in school, the men can't possibly complete the required amount of work in class. So varying amounts of home study are needed for the trainee to complete the course.

How records are kept

Big idea here is to hold the foreman's paperwork burden at a minimum. The trainee keeps the most important records on forms furnished to him. At the end of the week he fills in the form and turns it in to his foreman.

Once it's checked and countersigned by the foreman, the report form goes through the training department to the payroll department, where it's summarized on business machines.

From there it goes back to the training department where results are tallied. Our records show just how many hours' total experience a trainee has had under each type of work in his craft. It's the central control that assures a full range and variety of work assignments for every trainee. Every three months, the trainee's record is reviewed and recommendations go from the training department to the craft foreman calling for additional training in any area neglected in the man's work experience.

Requesting task tests • Each task consists of requirements covered by the activity work codes in each craft. The number of hours posted in his record quickly shows by inspection whether a trainee's experience is sufficient to justify a particular test.

If the foreman thinks the trainee hasn't had enough experience to take the test, he can delay it until the man is better qualified. But in practice, delays are few.

The training program is continually revised as new equipment is added to the plant. New skills or a combination of old skills are taught, and the new job breakdowns are integrated into the regular training program.

What is expected...

. . . OF SUPERVISION • The few additional responsibilities imposed upon supervision were immediately assumed in the spirit of cooperation. The supervisory force now considers systematic attention to training part of its daily routine.

For the craft foreman who bears the greatest part of the training load, the program means daily work scheduling with a view to giving each man broad plant experience.

Also, the foreman has to make weekly checks to make sure the trainee's records are accurate. It's up to him to instruct, or to detail a journeyman to do it both in the shop and in operating areas. He has to schedule task-performance tests. And he has to discipline any trainee who does not live up to the training agreement.

. . . OF THE TRAINING DEPARTMENT • It helps develop the training curriculum, controls textbooks, coordinates plant-school training, and keeps records of its own.

Our training department keeps the records on all progress reports and task performances. It issues task performance reports, promotion lists, and schedules. It also gives the admittance tests.

Sounds like a lot of work? Really only requires part time of one man and a secretary.

. . . OF THE UNION • A basic agreement in the company-union contract simply states that there shall be a mechanical department training program. Here's what the union has done, besides witness tests, to show its good faith:

• **Helps make training program policy.** Two union members serve with three management members of the steering committee. This committee was especially useful in instituting the program. Now it seldom functions. But it's still ready as a standby group to serve whenever major policy change is considered.

• **Helps pass on all recommendations for promotion and approve trainee's records.** Two union members sit on the "Board of Review" with two management members. The group members also make frequent appearances at night school to check on the progress of trainees and to serve in an advisory capacity.

. . . OF THE SCHOOL • The school staff wrote the instructional outlines and assignments for each craft on a contract fee basis.

All the way through, wide use was made of Hercules' engineering sketches and blueprints. The trainee learns from prints he can see as actual installations around the plant.

The school helped our "built-in testing" idea along too. Assignment sheets in blueprint reading, trade mathematics, and trade theory were specifically designed to teach the principles and theory of the task-performance tests.

During preparation of the course material, school staff members made frequent visits to the plant to talk with supervisors and the training department about the jobs and to see trainees at work. As a result, there's strong cooperation between the school and our trainees.

Standard textbooks as reference reading sources are also used in assignment. A total of 65 books were adopted for the four-year course. They're furnished free by the company, or may be bought by trainees at half the cost to the company. The fact that almost 90% buy the books indicates to us how much interest there is in the course.

THE PAYOFF • You'll find the benefits listed on pages 96 and 97. And the pay-off at Parlin has been duplicated at other Hercules plants. The plan works for us even where there are no local vocational schools available. At two of our plants we've used correspondence schools to meet the needs of the instructional phases of the program. And with very satisfactory results.

JET DIVISION, PARKER APPLIANCE COMPANY, CLEVELAND

"Will It Pay for Itself?"

THAT'S THE YARDSTICK Parker Appliance uses every time somebody proposes a better method.

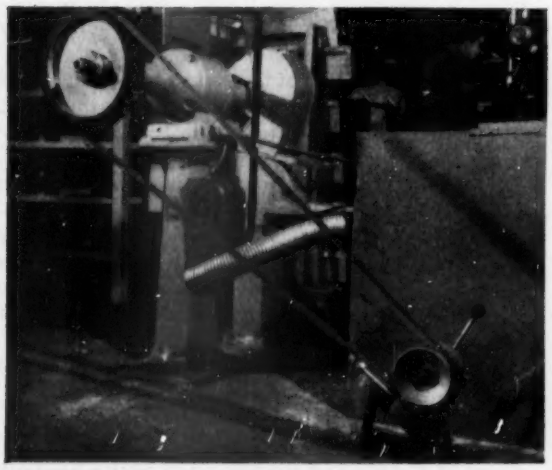
If the answer is *yes*, it's put to work—in a hurry.

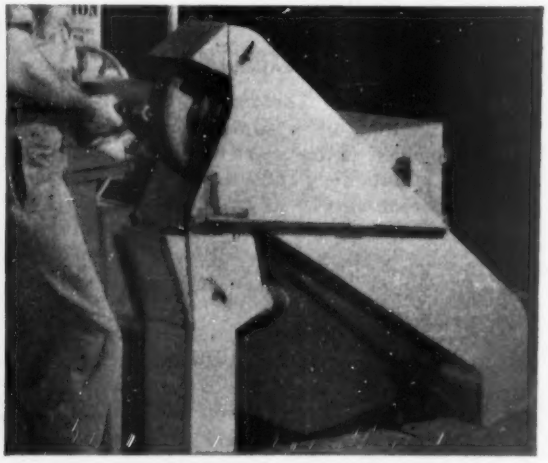
Which explains briefly why . . . . . none of the four shortcuts shown here is a worldbeater.

. . . each, for the small investment involved, pays big rewards —in better quality, increased output, more effective utilization of equipment, and a neater shop.

Better welds with dry electrodes

Parker tackled the problem of improving weld quality by pre-drying stainless steel electrodes before shifts. Welds are d-c filler-arc type, must be mechanically strong and pressure-tight. Small insulated electric drying cabinet now maintains prescribed electrode temperature automatically. Parker finds properly dried electrode flux slags out weld impurities. So welds are more uniform and solid; rejects have been cut.





A standard buffing stand acquires new skills

Parker adapted a standard buffing stand for abrasive belt de-burring. An adjustable tail sheave was anchored to the floor. Then a rubber-tired back-up wheel was slipped on drive shaft in place of buffing wheel. Flexible pipe leading to vacuum dust collector was connected to guard covering the belt. Other side of buffing stand was similarly equipped to take buffing wheel, grinding wheel, or belt.

For $100, positive control of welding speed—and quality

Parker's problem was to Heli-Arc-weld lengths of stainless steel tubing to stainless steel sleeves, the finished parts to be pressure-tight. Parker engineers settled on low-price home-workshop lathe modified to chuck tubing and hold sleeves. Driving this lathe is a gear-type speed reducer powered by a ¼-hp. motor. Welding unit is grounded through lathe bed so that an arc is struck as electrode approaches work. Part being bead-welded rotates at required 2½ rpm. Lathe loads and unloads quickly. There's good visibility. It's easy to position electrode. Position of drive belt fixes speed. Whole rig cost less than $100.

Two-color trays speed small-parts handling

Molded plastic trays, weighing a half-pound each, simplify handling, job identification, and lot control of small parts. Trays are in two colors to help assembler tell parts apart. Here operator is deburring high-precision parts with dental drill. Parts come to him on trays holding 50 pieces each. Trays carry small parts through whole manufacturing process, including inspection. After inspection, parts may remain on trays stacked for temporary storage. Counting parts in process is as simple as counting full trays. And labor charges can be applied to full tray lots.

Don't skip this article when you find out it's based on experience in setting up a new plating room. Here's why: That's where a lot of familiar problems bob up in their most exasperating form. So, if this company found the right answers for a plating room, planning any new department should be duck soup for you. We practically guarantee some of your answers in this slew of . . .

Problem-Solvers for Production Planning . . .

By PHILIP HARRIS • Assistant Production Manager
Espey Manufacturing Company, Incorporated
New York

. . . on layout planning

It costs a lot less to alter plans for an installation than to alter the installation itself. That's why we didn't firm up plans until we . . .

. . . **consulted everybody in the plant** with even the slightest interest in the project.

. . . **got advice from our insurance company** and from vendors of our plating supplies and equipment.

. . . **filed plans** with the proper city and state authorities to insure conformance with labor, fire, housing, and building codes.

Result: No troubles.

. . . on process heat

For economy and efficiency, we heat with steam coils installed in the bottoms of the tanks right in the solutions. The coils were made to be easily removed when the tanks are cleaned. Any coil corrosion? Yes, in some tanks. So we treated those coils with acid-resisting paint.

We rejected . . .

. . . **gas flames** under the tanks because they're a fire hazard and lose heat to the surrounding air.

. . . **steam-jacket heaters** because we would have needed double-walled tanks to cut down heat loss.

. . . **live-steam heating** because the condensed steam would weaken the plating solutions.

. . . on electrical supply

• **To protect selenium rectifiers from corrosion,** we located them outside the plating area, with the power leads passing through a wall. This keeps cleaner air flowing through the units, prevents the fan-cooled rectifiers from overheating because of clogged ducts.

If you can't put your power supply outside the plating room, at least keep the equipment off the floor. Otherwise water will splash onto the rectifiers—and may damage the selenium stacks—when you wash down the floor.

• **To protect electrical outlets in wet conditions,** be sure the outlets are of the three-pole type, which provides for a grounding wire on each device. Receptacles should be watertight and capped.

. . . on plating electrodes

• **To avoid poor plating quality caused by breakdown of electrode insulation,** it's a good idea to . . .

. . . **use water-repellent insulating material** for electrode supports. Our electrodes are mounted in fixtures, which are insulated from the plating tanks and grounded surfaces. Our maintenance department electricians make periodic resistance checks of the plating circuits to prevent possible leakage to ground.

. . . **use insulating paints.** They provide smooth finishes so that insulators can be wiped clean with a cloth.

. . . **install your electrodes for easy removal** and cleaning.

. . . on water supply

• **To keep the work area clear,** our feed-water system is well above the plating tanks, has vertical drops to each tank. Return lines are suspended from the ceiling of the floor below, thus letting us keep all tank surfaces in the same plane. Otherwise we'd have to raise some tanks to get the proper grade for waste removal.

• **To conserve water,** it's wise to put a restricting orifice in the supply line. Whether you buy water—as we do—or pump it from your own wells, costs mount unless you control its use. Where you need a continuous flow—as in plating operations—you'll waste a lot unless you adjust the flow to the amount required. Control valves? Don't depend on them. Chances are your operators will open them wide, regardless of instructions. But a restricting orifice will prevent waste no matter what your operators do.

• **To protect against overflow,** we put threaded standpipes in the corners of appropriate tanks. The pipes are made of wrought iron for long life, can be unscrewed and removed for complete tank cleaning.

• **To allow for future expansion,** we installed plugged tee outlets in return lines.

. . . on cranes and craneways

• **To cut installation costs,** lay out your craneways before you lay out your ventilating ductwork. It's much easier to pipe around a craneway than to buy track bends to snake around piping.

• **To protect your men,** insulate all power rails. There's a lot of water in plating rooms. If your men stand in water and accidentally touch an unprotected power rail, they may be electrocuted or severely burned.

• **To avoid downtime . . .**

. . . **include a track section that can be cut off** from the rest of the craneway. If a hoist develops trouble, you push it onto this section, then work on it without shutting down the whole system.

. . . **sectionalize your power rails** with sectionalizing switches. This helps you find power trouble fast, and make repairs in one section without closing down the whole system. For example: Your system may have more than a thousand insulators supporting power rails. Suppose one breaks down. Finding the trouble may take hours unless your power rails are sectionalized.

. . . on sprinklers

• **To save money,** we arranged our sprinkler system before moving equipment into the new plating area. It costs less to do the arranging beforehand than later at the request of your insurance carrier—and with the plating room in full production.

• **To protect against corrosion,** we used lead-coated sprinkler heads instead of bronze heads.

• **To keep plating tank heat from setting off the sprinklers,** we used sprinkler heads with higher-than-normal activating temperatures.

. . . on ventilation

Many types of acids are used in our plating processes. Heated solutions in open tanks give off corrosive fumes. These fumes must be trapped and exhausted from the room. Otherwise, they damage equipment and endanger employees' health. To clear the plating area of fumes, we installed two exhaust systems.

Where corrosive fumes are exhausted . . .

. . . **hoods and ductwork** are made of a pressed asbestos material instead of sheetmetal.

. . . **wood pieces** holding the ducts together are heavily coated with protective paint and fastened with stainless steel screws.

• **To keep fumes out of neighboring areas** during off hours, we run the smaller of our two exhaust systems all night.

• **To drain the condensate**—and prevent it from dripping back into the tanks—a trap was installed just ahead of the vertical riser.

But fumes escape with even the best ventilation. So we . . .

. . . **treated walls, steelwork, piping, tank supports,** and other nearby surfaces with acid-resisting paint.

. . . **built our new partitions of terra cotta blocks.** They resist corrosion better than other materials.

Where corrosion was no threat, we used galvanized iron ducts. Duct lengths were telescoped into each other in the direction of the air flow. The lap joints were spot-welded, soldered airtight, and edge-coated.

HIS $1000 SUGGESTION...

Full-time investigators give Gates Rubber

A Suggestion System That Really Clicks

Gates Rubber's suggestion plan looks almost ordinary until you check the results: 1120 suggestions per year per 1000 employees. That's six times the national average. Better than 20% of submitted ideas are put to use and win awards. Here's how it's done:

$1000 CHANGES HANDS as Casper Brecht, belt lathe operator, receives suggestion award check from Vice President Harry Gates. Brecht had felt his operation was wasting material and limiting number of belts per set-up because of a poor cut-off arrangement. But he had a bright idea, so he submitted it.

EMPLOYEES REALLY TURN IN SUGGESTIONS at Gates Rubber Company, Denver. Possibly the biggest single reason that 6500 employees turned in 8882 suggestions (including 2317 award winners) last year was this:

Every suggestion is subjected to "professional investigation" by one of three men whose only job is investigating and expediting suggestions.

These men are additional to the usual suggestion committee and a full-time suggestion supervisor and his secretary-clerk.

WHY INVESTIGATORS? They serve a triple purpose:

1. They emphasize to employees that management really means business on the suggestion plan; that management is willing to spend time and money (as well as cash awards) to carry it out.

2. They represent a guarantee to employees (and to management) that worthwhile suggestions will not be stymied either by apathy or by an individual who simply doesn't care to change.

3. They tend to discourage frivolous suggestions and gripes. Knowledge that suggestions are investigated by pros, not simply thrown on the table before a committee of brass, makes it rather pointless to submit "ideas" about how the boss should part his hair.

ADD THESE TOUCHES. Investigators alone haven't produced the big volume of worth-while sugges-

...WAS INVESTIGATED AND PROVED IN THESE FOUR STEPS

1 INVESTIGATOR OLLIE LONGAN is assigned by Suggestion Supervisor Jerry Litzau to follow up idea. This happens day after Brecht puts suggestion in box. But even before this, Brecht got an acknowledgment.

2 FOREMAN JOE BATH of belt lathe department and Investigator Longan get right down to brass tacks, talking about the possibilities of this suggestion. Neither is excited yet, but they agree it merits more investigation.

3 METHODS ENGINEER QUILL BRENNAN listens to Longan and Bath. Then Brennan designs new cutter and holder, has a model built for testing. It still looks good, so one machine is modified for an actual production run.

4 SUGGESTOR BRECHT demonstrates improvement for Litzau and V.P. Harry Gates. With the idea now proved on the floor, the awards committee makes Brecht the ninth man at Gates to receive the top suggestion award of $1000.

tions. Gates is doing several other "little things" that set its plan apart from the run-of-the-mill suggestion system:

- Suggestion boxes are emptied *every day*. The employee receives written acknowledgment of his suggestion, in a plain sealed envelope, the same day.
- The suggestion system has the official standing of a "department."
- Offices of the suggestion department are just opposite the time house. All employees must pass the door when entering or leaving the plant.
- Investigators are responsible for helping an employee, on request, to write up his suggestion. And this goes beyond mere penmanship and clear expression of ideas. The investigators will discuss an idea, help the employee refine it and work out the non-technical details. So that this service will be available to workers on the graveyard shift, each investigator comes in early once a fortnight.
- In addition to cash awards based on savings, certificates of merit are presented to first award winners. After a man has had 10 suggestions accepted, he gets a framed gold certificate and an engraved pen-and-pencil set. (So far Gates has made 280 such awards.)
- Suggestions that cannot be accepted immediately are "protected" for one year, after which their sponsors are encouraged to resubmit them.

For more about the Gates plan, turn the page.

How Suggestions Are Investigated

After a suggestion is received and goes through clerical processing (recording and acknowledgment), it is assigned to one of the investigators. Choice of investigator is usually determined by the department affected—each man has a regular "beat." Suggestion Supervisor Jerry Litzau feels that in this way his investigators get a better knowledge of the practical problems they'll face, develop a close relationship with the department heads, and become familiar to employees.

NUMBER ONLY. It's worth noting that the suggestor's name is not attached to his suggestion at this stage. Only an identifying number is used until the suggestion is accepted or rejected—except in the case of a "tentative acceptance," where more information may be needed from the suggestor. This "number only" technique eliminates any chance of personal prejudice or reactions like "Joe's just a comic-strip inventor. Let's not waste time on his crackpot schemes."

First concrete step in processing a suggestion is for the investigator to discuss it with the head of the department concerned. No suggestion is rejected without this discussion.

If the suggestion seems to merit more investigation, it is referred to the technical department (if materials are involved) or to the industrial engineering department (if it is mechanical or involves a change in methods).

NO PIGEON HOLES. Here's where the investigator really earns his keep. More than half of all suggestions are referred to some department beyond the one immediately involved. The biggest job of the investigators is to see that none of these 4000 or more suggestions a year gets pigeon-holed or unduly delayed.

If preliminary work in the technical or engineering departments indicates real promise, then the material, part, or equipment is ordered. The investigator follows through to see that the order is not sidetracked in the machine shops, maintenance shop, or some other department.

Where equipment changes are involved, the investigator makes periodic checks during a 30- or 60-day floor test. And, when needed, he applies some pressure to see that possible further modifications of the original suggestion are made to make the change successful.

How Gates Picks Investigators

Personnel testing for employment and promotion is standard procedure at Gates. The technique was used in selecting the suggestion system investigators. But it was a special battery of tests that was given in this case. Major emphasis was placed on tests of mechanical comprehension, plus special interest in mechanical, computational, and persuasive promotional fields.

The most important requirement, however, was demonstration of a basic interest in other people rather than in things.

PREVIOUS EXPERIENCE. The common denominator among the men selected (no turnover thus far) was that all had had previous experience in procedure analysis and in investigative work of some sort. Beyond that, one of the investigators is a graduate engineer; another was formerly a supervisor at Gates; the third used to work with another rubber company.

The case load of the investigators is variable and depends largely on the type of suggestions they have received. Some suggestions can be acted on in a matter of days. Others take months before a final determination is made. So the investigators need the kind of mental agility that permits a man to work on—literally—100 or more projects at once. In the past 12 months, each of the investigators has closed the file on an average of slightly more than 200 suggestions per month.

And as part of the closing process, the investigators have had the satisfaction of seeing more than 20% of the files marked, "Suggestion adopted, award paid."

The high and low cost of suggestions

Five full-time people to administer a suggestion department sounds like a high price to pay for a successful system. Salaries and overhead exceed by far the $36,689 in cash awards paid out last year. But not by a ratio of six-to-one. And that's the ratio by which Gates exceeds the national average in terms of suggestions per employee. Any company incurs *some* administrative expense in running a suggestion plan.

Even average performance on a suggestion system produces a substantial net saving to a company. Gates figures that to get a bit less saving (because of added administrative cost) on each of six times as many suggestions is the best deal to come along in quite some time.

How to Cut Your Power Bill

Power bills aren't complicated. They just look that way.

▶ *Essentially they include four charges—demand, power factor, energy, and fuel adjustment.*

▶ *All four are easy to understand—and, when understood, easy to do something about.*

▶ *This article will prove it to you. We're indebted to Mr. W. Brouillard of Canadian Celanese Limited for contributing a manuscript on which this article is based.*

ONCE A MONTH, you can be sure, you will get a bill from the power company that supplies your plant.

If yours is a typical plant, chances are that few people see that bill. It comes into the accounting department, is sent down to plant engineering to see if the meter readings check, and then on to accounts payable. Just because it's a monthly bill and usually comes out of the plant engineer's budget, the attitude seems to be: "Why worry?"

That's a shortsighted attitude today. Electric power bills seem to grow by leaps and bounds because of the increased amounts of power being used in industry. Plants that used to have power bills of $300 or $400 a month suddenly are in the $5000 to $10,000 class.

Furthermore, let's get rid of that notion that it's plant engineering money that pays the bill. It's *plant money*—money that could be fattening up profits if it didn't go for power.

Actually, the power is used mainly by production and other operating departments. What they do with electric power and when they use it, largely determines the amount of the bill. It follows that a power bill should be the concern of many executives in many departments. But that can happen only if they understand the power bill, how it is calculated, and how they can help reduce it.

What's in your power bill?

Each power company has its own rate structure and method of calculating its bills subject to public power commissions in the various states.

But in general power bills include the following four charges:

1. DEMAND CHARGE • The subject was covered thoroughly in May 1953 FACTORY (part 2, page B-201). Briefly, demand is normally the highest amount of power you use in a specified period (usually 15 or 30 minutes, depending on the contract with the power company) for the month that is being billed. This high reading is known as the "maximum demand" and is the basis for establishing the demand charge item in your monthly bill. It is to your advantage to keep this demand charge as low as possible. (Later on, specific means of reducing demand charges will be discussed.)

2. POWER FACTOR CHARGE • Power factor clauses are showing up in more and more power contracts, and in turn show up as an additional penalty charge on your power bill. It works this way:

The power company sets a minimum power factor figure that is to be maintained by the plant at all times. This may be measured on your main meters, or the power company may take a spot check once or twice a year.

Say the power company requires 85% power factor, which is the most common figure. As long as your plant system operates above that figure, you have nothing to worry about. But, if you fall below it, there may be penalties coming. On the other hand, most power companies also offer premiums for good power factor.

Here's how they usually figure premiums and penalties. Say your plant demand is 1000 kw., and the power company requires 85% power factor. Measurements show that your plant is operating at 90%. The demand billing in that case will be 1000 kw. X $\frac{85}{90}$, or 944 kw. At $1.75 per kw., you save $98 at 90% power factor.

But now say your power factor falls to 70%. The demand billed will be 1000 kw. X $\frac{85}{70}$ or 1215 kw. At $1.75 per kw., your bill shoots up to $376.25 more than it would be at 85%. That's a sizable penalty—and fairly typical. (Actually, it will be even more than that on the total bill, as will be shown later on.)

3. ENERGY CHARGE • This is the part of the bill that represents the actual power that is being put to

work. There's not much more to be said about it at this point. It's metered, and you pay for what you actually use.

4. FUEL ADJUSTMENT CHARGE · Most power companies (except where water power is used) now include this item in bills. It is based on the cost of fuel to the power company, and is added to the bill to take care of the rise and fall in the price of fuel. Companies make such charges to avoid constantly new rate schedules with utility commissions every time fuel prices change.

What your bill looks like

Let's look at a typical power bill and see how it is influenced by the various components we have just discussed:

FEBRUARY

	Rates	Amount	
No. of days 28			
Power Factor 85%	200 @ $2.00	$ 400.00	
Demand (kw.) 1885	800 @ $1.75	1400.00	
	885 @ $1.40	1239.00	
		$3039.00	$3039.00
Energy (kw.-hr.) 942,500			
1885 kw. × 50 hrs. 94,250	@ $0.017	$1602.25	
1885 kw. × 50 hrs. 94,250	@ $0.015	1413.75	
Balance kw.-hrs. 754,000	@ $0.0025	1885.00	
942,500		$4901.00	$4901.00
Fuel Adjustment $0.0015			
942,500 × $0.0015		$1513.75	$1513.75
			$9453.75

Here, step by step, is how the above power bill is figured out:

Power factor meets the requirements of the power company's minimum of 85%, so there is no penalty.

Demand rate is figured as follows: The first 200 kw. is billed at the rate of $2 per kw., the next 800 carries a rate of $1.75 per kw. and the balance of the demand is billed at $1.40 per kw.

Energy charge rates are based on the utilization of the maximum demand for certain periods of time. In this particular bill the steps are 50 hours. Demand in kw. times 50 hours is amount of power in kw.-hrs. that is billed at the first step rate.

The amount of power that is billed at the second step rate is figured the same way. The amount of power in each of the first two rates is added together and this total is subtracted from the total amount of power used in the whole month. The answer is the amount of power that will be billed at the third step rate. The total energy charge, of course, is the sum of all three rates.

Fuel adjustment is figured on the total kw.-hrs. for the whole month and has only one rate for this month. The rate may vary though from month to month and should be checked.

THREE BIG WAYS

Basically, there is one main approach to cutting your power bills. That's to reduce your demand (remember, this doesn't mean to use less power —but to use it more evenly).

You can do this in three ways . . .

. . . **Indirectly,** by (1) improving power factor.

. . . **Directly,** by physically reducing (2) your maximum demand and (3) your energy charge.

Improving power factor

If your contract contains a power factor clause, there are several things you can do:

1. You can buy capacitors that will improve the power factor. They're readily available, and the manufacturer can show you what's needed for your problem.

2. You can get synchronous motors that have 80% corrective characteristics. These will do the same job as the capacitors, but they usually come in the larger sizes (150 hp. and up).

3. You can concentrate on removing the main causes for poor power factor in your operations. The biggest contributor to poor power factor is a.c. motors that are not fully loaded. Feel some of your motors. If they are not hot (we don't mean roasting—that's too hot!), chances are they are not running at anywhere near full load. These are induction motors, so the closer they run to full load, the better the power factor. Take some load checks with instruments (any trained electrician can do it—it's easy). Swap motors around to get the right motors on the job. If you have a 10-hp. motor doing a 5-hp. job, it's time to swap.

Here's an actual example: A chemical plant in the midwest had a lot of pump motors. The maintenance people found that more than 75% of them were only half loaded. They tested the motors and swapped them around as needed. After a year they found their power factor had improved 15%.

Now let's see what happens to a power bill when you improve your power factor:

Let's assume that the power factor in our sample bill was only 70% instead of 85%.

The demand then would be 1885 X $\frac{85}{70}$ or 2289 kw., as compared with only 1885 at the 85% power factor level. And the charges would go up correspondingly.

For example:

Demand 2289	200 @ $2.00	$ 400.00
	800 @ $1.75	1400.00
	1289 @ $1.40	1804.60
		$3604.60

The bill's already much higher. But that isn't all. How about the energy charge? The same amount of energy was used, of course. But now look at the billing for this item.

	Demand	$3604.60
2289 kw. × 50 hr. = 114,450 @ .017	= $1945.65	
2289 kw. × 50 hr. = 114,450 @ .015	= $1716.75	
Balance kw.-hr. = 713,600 @ .0025	= $1784.00	
	$5446.40	$5446.40
Fuel adjustment The same		1513.75
		$10564.75
Total charges under 85% power factor		9453.75
Additional cost if power factor falls to 70%		$ 1111.00

By the same token, if the power factor is improved over the 85%, you will now get a saving over the first bill. In all three cases, however, you are doing the same amount of work, turning out the same number of tin cans or what-nots. But for a different power cost.

Reducing power demand

In our power factor calculations, we actually changed the demand by power factor improvement. But that was indirect. You can also change demand directly and get additional benefits.

Here's an example: Say you manage to reduce the demand from 1885 to 1500 kw. In the bill we've been discussing, you immediately save 385 kw. @ $1.40 or $539. But you also get savings on the energy charges, as follows:

1500 kw. × 50 hr.	75,000 @ .017	$1275.00
1500 kw. × 50 hr.	75,000 @ .015	1125.00
Balance	792,500 @ .0025	1981.25
		$4381.25

The old billing for this item was $4901, so you come up with a saving of $519.75. Plus saving on demand charge of $539, this gives you a total saving of $1058.75. As in the case of power factor improvement, you can save over 1000 beautiful dollars by reducing your demand directly.

How you go about reducing demand will depend on your operations. Here are two illustrations:

• **In a metal-working plant,** examination of the demand chart revealed that maximum demand occurred mostly between 10:00 and 11:15 a.m. The first place to look for relief in such cases is to spot large loads that are not on the line all the time. In this plant, they quickly identified two annealing ovens. The total load of the two was 2000 kw., which was a good slug of power.

Observing normal operations, it was noticed that loading the ovens began at the start of the shift (8:00 a.m.) and took two hours to complete. That meant that the ovens were on 100% from 10:00 a.m. until they reached control heat, which took about two hours. Going on the line at 10 a.m. meant that the ovens were sure to be on the line when the plant reached its peak demand. The schedules were changed so that the ovens were unloaded at the beginning of the shift instead of at the end of the preceding shift. It took two hours to unload and two hours to load. This meant that the ovens were then put on the line at 12 o'clock when the plant power load was down anyway.

Result: an immediate reduction of over 1500 kw. in demand, a reduction in the power bill of over $2500, and no change in production output.

• **In this same plant** it was noticed that the air compressors were operating at 120 lb. pressure. Nobody knew why the pressure was so high. It used to be 90 lb., which was ample. They cut the pressure back to 90, and corrected several leaks.

Results: One air compressor operated by a 150-hp. motor was shut down. Another 100 kw. of power was saved, and $150 a month was cut off the demand. They also saved energy in kw.-hrs. of power wasted by leaks and excessive pressure.

• **Another plant saved over $3500 a month** by scheduling one department to work on the second shift, thus cutting the daytime peak demand. This saving is *net*—taking account of premium pay and additional lighting costs for night work.

• **Here is an even bigger pay-off.** A large aircraft plant hired three load dispatchers to control the demand. The first month, the power bill was reduced $17,000. And the second month's saving was $22,000, despite higher production output. Production supervisors soon got on the ball and cooperated with plant engineering to schedule heavy loads with a view to reducing demand charges.

Reducing energy charges

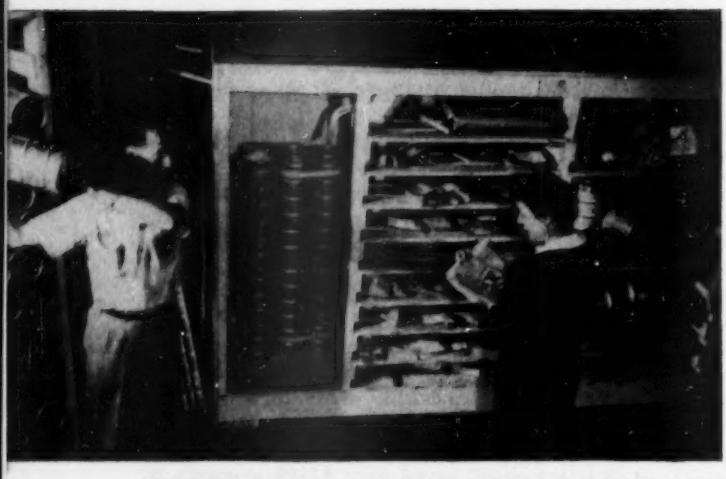
Now how about waste power? This shows up in the energy charge, and you get soaked double when you figure in fuel adjustment charge. Spectacular savings can often be made here, too.

One simple step is just turning off the lights when they aren't needed. With so much light around, plant people get careless and take it for granted that the other fellow will turn off the lights. Why is it necessary for the whole office area to be lit up just so the janitors can empty the waste paper baskets and sweep the floor? Why not take time to show them where the lights are located and impress on them the need for power conservation?

Then there is always the worker who forgets to shut off his machine before he goes home. Many machines use some sort of clutch arrangement so that the machine is shut off but the motor is left running. The installation of a pilot light may solve the problem—especially if the motor is buried out of sight in the machine. Blowers are also often left on to eat up power and waste heat.

The place to start all this is your power bill. Look it over, note its various components, and then get busy reducing each item wherever possible. You may be surprised at the results!

OPERATING SHORTS

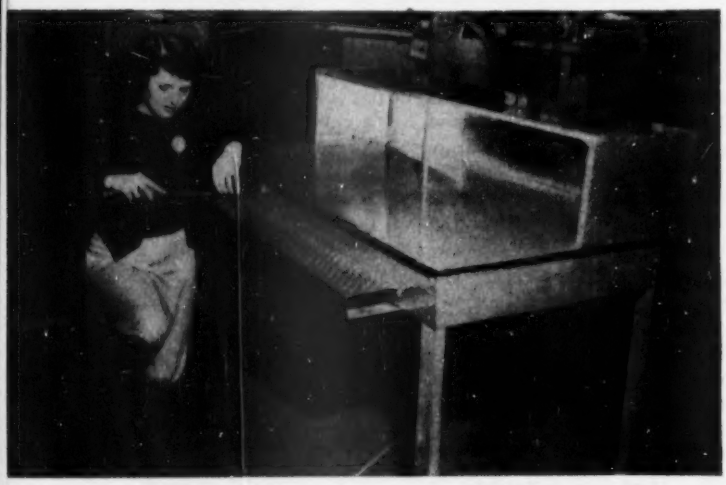


Stock Carts Serve Assemblers

"Serve-yourself" stock carts save assembly time at Consolidated Vultee Aircraft's San Diego, Calif., Division.

Central stock crib personnel fill carts (see photo), then roll them to work stations on the primary assembly line. There employees help themselves to parts as needed. Each cart load contains items required at a given station for a given period in the production schedule.

When parts were issued individually from the crib, employees lost time traveling between work stations and the crib.

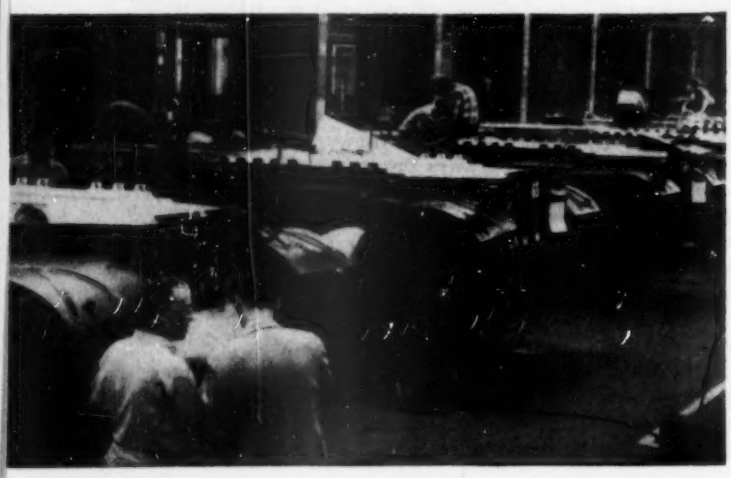


Trainees Produce While Learning

This new employee is finishing a coffee-urn table made in the training school at Boeing Airplane Company's Seattle plant.

To be used for Boeing food service, the table would have cost $43 if purchased outside. Fifty-three different kinds of metal products with a total value of more than $23,000 were fabricated by trainees last year for use in Boeing offices and shops.

Products are selected to give trainees practical work along lines most useful to them. Included are wastebaskets, wire reels, file dividers, dust pans, letter files.



Doubling Assembly Line Capacity

How to get a maximum number of work stations in a fixed length. That was the problem when American Locomotive Company, Schenectady, installed a tank assembly line in an existing building.

Here's the solution: Tank hulls were turned sideways and mounted on dollies. This provided almost twice as many work stations as assembling the tanks lengthwise. A "towveyor," protruding through a slot in the floor, engages the dollies and pulls them from position to position.

Handling Polished Parts Without a Scratch

Nicks and scratches on ground bearing rollers used to be a problem at The Timken Roller Bearing Company, Canton, Ohio. But not now, thanks to a new way of transferring the rollers to a receiving tray.

Old method · During the finish grinding of rollers, they were dropped down a perforated chute into the receiving tray. The drop was only a few inches. But the impact of one roller dropping on another sometimes caused surface nicks.

New method · The chute was replaced by a flexible tube, with a leather-encased end to protect the rollers. A simple gear mechanism slowly rotates the tube in a small circle around the bottom of the receiving tray. Each roller is literally laid in the tray.

Result · Timken says: "Nicks in bearing rollers, caused by the drop from the machine to the receiving tray, have been eliminated; waste has been substantially reduced, and accuracy increased."

Special Lighting Cuts Eye Strain

High-diffusion lighting, with adjustable intensity, reduces eye strain in the inspection of bottled beer at the London, Ont., bottling plant of John Labatt, Ltd.

Each lighting fixture has a panel of five fluorescent lamps. The panel fits into a box behind a glass baffle that diffuses light. Light intensity can be adjusted to laboratory specifications by switches on the fixture. The lamps in each panel are inspected and replaced as a unit.

Turn the page

OPERATING SHORTS . . . Begins on page 110

Safety Suits Cut Furnace Downtime

This $160 suit lets the wearer work for 45 minutes in temperatures up to 400 F. It has saved 335 hours of heat-treat furnace downtime in three months at the Belleville, N. J., plant of Walter Kidde & Company, Inc.

Formerly, when controls needed adjustment, furnace was cooled two days before men could work in control area for maximum of 30 seconds. Now process is uninterrupted.

Suit and hood are aluminum-painted fabric. Gloves resist heat to 1600 F. Shoes are asbestos. Fresh air is fed to compressed air mask by air purifier and pressure reducer from plant's compressed air line.

Automatic Doors Speed Shipping

Heavy factory doors at Synthane Corporation, Oaks, Pa., snap open at the approach of even the smallest shipping case or container.

Synthane installed electronically operated, door-opening mechanisms to speed traffic between the production and shipping departments.

Arrows indicate "electric eye" beams. Interrupting the first beam opens the door, which then stays open until the second beam is interrupted.

Heaters Dry Shot-Blast Pit

Frequent shutdowns—and a messy job that no one liked—have been eliminated by putting electric heat to work in this shot-blast pit at Denison Engineering Company, Columbus, Ohio.

Natural moisture in the air system tended to make the shot cling together. So these Chromalox strip heaters (arrow) were clamped to walls of the pit to keep shot dry and free from caking.

Pay up 21%, labor cost down 39%—with...

Incentives in the Warehouse

By KEITH BOAZ, Time Study Engineer
Logan Company, Louisville

ONLY FOUR WEEKS from "gleam in the eye" to finished product! That was actual elapsed time on Logan Company's new incentive plan for warehouse workers. Two weeks to develop standards. Two weeks to change layout and methods.

It may not be a record. But we had figured it would take us *at least four months.*

REWARDS · This saving of time pales into insignificance when we cite certain other savings. We had figured on some benefits—but they exceeded our fondest hopes. For instance:

- **50% reduction in work force**—from two supervisors and ten men to one supervisor and five men.
- **39% cut in labor costs**—but a 21% boost in wages.
- **10% improvement in shipping time.**
- **Better utilization of warehouse space**—additional warehouse capacity without building.
- **Full utilization of handling equipment**—one man per truck, instead of two.

Two factors helped "sell" the plan:

1. The men were given a chance to earn more money on traditional day-rated jobs.
2. The men who had to be cut from the force were immediately transferred to other jobs of equal pay.

WHERE WE STOOD · Our previous situation was probably similar to what you find in many plants. A large percentage of employees were already covered by incentives. But not the warehouse force and other indirect workers. Much of the gain from incentives was being dribbled away in our day-rated operations.

Our Louisville warehouse has three floors of about 10,000 square feet each. We are really a large job shop, irregularly producing a wide variety of products—conveying machinery, furniture, ornamental iron work, metal beds, mattresses, and a few more—in many shapes, sizes, and weights.

We had never set aside specific parts of the warehouse for specific items. We stored items, when we needed to store them, wherever there was space.

We had accepted the situation as an inevitable condition of our type of business. We had thought it too much of a job to tackle.

How Logan Tackled the Job

HIRED A CONSULTANT · We knew we needed outside help. So first thing we did was get a staff engineer from a management consultant firm, Serge A. Birn Company, Inc., to work with us.

REARRANGED WAREHOUSE · Next step was to make scale layouts of each of the three floors of the warehouse. Then we asked supervisors and workers for their opinions on aisle locations, stacking areas, hand truck parking, marking and packing areas, identification of areas, etc.

Next we studied records of sales and a sales forecast by products to determine manufacturing frequency and storage requirements. Finally by combining the results of this study with layout suggestions, we rearranged the warehouse. Rearrangement included laying out aisles and painting borders; building bins and racks, designating and identifying storage areas; relocating material according to a master plan which was posted in the warehouse office. In our new layout we have larger aisles, but a lesser number. And we make more use of vertical space.

New methods of storing and order filling were worked out, too. But we postponed installing those methods until we installed the incentive.

All that took just two weeks, cost $2000, excluding the engineers' time.

SET STANDARDS · In another two weeks' time the incentive standards were ready, based on the new methods. The incentive is a straight piecework plan. In addition to his guaranteed hourly rate, each warehouseman is paid extra earnings in direct proportion to the amount of work performed. His work is measured by basic time standards (see tables on pages 114 and 115).

To set the standards we used stopwatch time study and simplified Methods-Time Measurement (FACTORY, August 1950, p. 83). We used MTM to set approximately 95% of the standards, time study for the remaining 5%.

Travel times were established by pacing off the distances and applying walking standard values.

Standards for handling the various items and for marking were set by establishing the motion patterns required, then applying the MTM values to the motion patterns.

Turn the page

COACHED THE MEN • With the standards completed, we spent one day coaching the men in the new methods. The next day we applied the incentive. As you might expect, the first day's performance was low—approximately 40%. But the engineers stayed with them for a few days, and performance climbed rapidly to a point where the incentive started paying off—for both men and company.

APPLIED STANDARDS • This is the way the system now works: From orders to ship, a clerk in the warehouse office works out the most economical hand-truck loads—requiring least travel distance—to pick items from storage to fill the orders. He lists the items on a "route sheet" and applies the standard time allowances to the sheet. He gives the route sheet to a warehouseman, along with copies of the orders to be filled.

The route sheet shows the warehouseman what he's to do, and how to do it. Also, it shows him how much time is allowed to gather the items and deliver to shipping. Time, in standard minutes, is easily converted to money because the incentive is straight piecework. So the warehouseman can check the time allowed and keep track of his earnings. For occasional work not covered by standards we pay the day rate for that job.

As warehousemen complete route sheets, they turn them in at the office to be checked and forwarded to payroll accounting.

We believe this method of showing the men the time allowed is a chief factor in the success of our incentive.

ROUTE SHEET

ORDER NUMBERS A3042 A3043 C3192 A3274

DATE 7-27 ROUTE SHEET NO. 1

QUANT.	ITEM	AREA	TRAVEL TIME	LOAD TIME	TOTAL TRAVEL & LOAD TIME	MARKING TIME
	WORKING FACTOR (CONSTANT ALLOWANCE)				.49	
3	#611 Screens	C-4	.30	.45	.75	
1	#1025-38 Screen	C-4	—	.15	.15	1.26
2	#331 Andirons	C-6	.27	.30	.57	
2	#1425 Fire sets	C-6	—	.30	.30	
	To	C-1	.48	—	.48	
5	#346 3/3 beds	B-2	.19	1.71	1.90	.86
2	#346 4/4 beds	B-2	—	.68	.68	
1	#350 Chair-G	B-7	.44	.15	.59	
1	#350 Chair-R	B-7	—	.15	.15	
	To	B-1	.43	—	.43	.72
1	#950 Glider-G	A-10	.38	.41	.79	
1	#950 Glider-R	A-10	—	.41	.41	
7	Bdl-Metal Beds					
	Rails	A-11	.63	1.38	2.01	.86
	To	A-15	.34	—	.34	
Open & close gate		3rd Fl.	—	—	.40	
			Total		14.66	3.70
					3.70	
	Total	allowed time			18.36	

1

LOADING STANDARDS

STANDARD MINUTES

	ROLLAWAY BEDS STOCK RAILS	FENDER SKIRTS FIRE SCREENS TABLES FIRE SETS CHAIRS GRATES HLY. BEDS WINDOW GUARDS ANDIRONS SPARK GUARDS FOOT SCRAPERS WOOD HOLDERS	STANDARD BED SPRINGS 1 OR 2	NO. 1 & NO. 2 BED SPRINGS	BED RAILS
QUANT.	1	2	3	4	5
1	.05	.08	.10	.10	.10
2	.10	.15	.10	.19	.19
3	.15	.23	.19	.29	.30
4	.21	.30	.19	.34	.40
5	.26	.38	.29	.48	.50
6	.31	.45	.29	.58	.59
	36	53	38	67	69

4

PAPERWORK Shown here are the route sheet and the basic time standards used in the Logan incentive plan:

1 ROUTE SHEET, prepared by a clerk from shipping orders, is a warehouseman's instructions for stock picking. In the order in which he is to pick up items—i.e., the most economical route—it lists items, number of each, location, and time allowed to gather and deliver items to shipping. Details of time allowance, as well as total time, are written on the sheet to save time and to eliminate questions about allowance. Clerk aims for one or more full truck loads in each route sheet.

2 CONSTANT TIME ALLOWANCES for an order (in minutes) cover the elements of work that must be performed regardless of distance covered and materials picked up.

3 TRAVEL TIME STANDARDS • Clerk reads directly from tables the time allowed to travel from any area to any other area in the warehouse. Allowed time is based on distance, standard travel rate, plus allowance for moving around the hand truck.

4 LOADING TIME STANDARDS cover removing items from storage and loading on truck. Items are grouped according to handling pattern for each. Table provides total allowed time for number of pieces to be picked up, eliminating multiplication by clerk.

5 MARKING STANDARDS are set up in convenient table so that clerk can quickly select and apply time to route sheets.

CONSTANT TIME ALLOWANCES

CONSTANTS FOR ALL ORDERS:

Includes:

Getting order & truck;
Getting to elevator;
Going up & down on elevator;
Opening & closing gate as required;
From elevator to stacking area.

	STANDARD MINUTES
Orders on 1st floor only	.51
" " 1st & 2nd floors	3.17
" " 1st & 3rd floors	3.64
" " 1st, 2nd & 3rd floors	4.71
" " 2nd floor only	3.17
" " 2nd & 3rd floors	4.71
" " 3rd floor only	3.64
Allowance for Parcel Post (from area 15 to P.P. area)	.41
Allowance to open & close gate on 3rd floor	.40

2

TRAVEL TIME STANDARDS

SECOND FLOOR

NOTE: (1) Distances between areas include eight paces for moving around truck.

(2) Distance to or from elevator includes four paces for moving around truck.

STANDARD MINUTES

AREA	TO 2	3	4	5	6	7	8	TO AREA 1
FROM 1	.19	.28	.36	.24	.42	.43	.58	
2		.16	.24	.34	.52	.44	.65	.19
3	.17		.16	.39	.57	.57	.72	.28
4	.24	.16		.47	.65	.65	.81	.36
5	.34	.39	.47		.23	.18	.42	.24
6	.52	.57	.65	.23		.23	.39	.42
7	.44	.57	.65	.18	.23		.23	.43
8	.65	.72	.81	.42	.39	.23		.58

3

TRUCK GATES	CONV. STANDS
6	7
.11	.12
.21	.24
.32	.36
.43	.48
.54	.54
.64	.73
.75	.85

MARKING STANDARDS

NOTE: Twelve paces added to labeling and stenciling to get brush or glue pot.

For shipment requiring two labels double time values.

STANDARD MINUTES

QUANT.	HOOK TAG	WIRE TAG	GLUE LABEL	STENCIL 2 LINES	STENCIL 4 LINES	STENCIL 6 LINES	LABEL & STENCIL 2 LINES	LABEL & STENCIL 4 LINES	LABEL & STENCIL 6 LINES
1	.12	.19	.34	.33	.43	.52	.58	.68	.78
2	.25	.38	.45	.54	.73	.92	1.05	1.24	1.43
3	.37	.57	.58	.75	1.04	1.32	1.51	1.80	2.08
4	.49	.77	.72	.96	1.34	1.72	1.97	2.35	2.74
5	.62	.96	.86	1.16	1.64	2.12	2.43	2.91	3.39
6	.74	1.15	.99	1.37	1.95	2.52	2.89	3.47	4.05
7	.86	1.34	1.13	1.58	2.25	2.92	3.36	4.03	4.70
8	.98	1.53	1.26	1.79	2.56	3.32	3.82	4.59	5.35
9	1.11	1.72	1.40	2.00	2.86	3.72	4.28	5.14	6.01
10	1.23	1.91	1.53	2.20	3.16	4.12	4.74	5.70	6.66

5

"Toby," Chuck said, "you could sell eggs to hens."

To Write or Not to Write

By RAY W. SHERMAN

CHUCK FARR, INDUSTRIAL ENGINEER for Central Manufacturing, had read the letter so many times the only answer he could think of was an old Spanish proverb from college days: "Maybe yes. Maybe no. But the most probable is: *Who knows?*"

Slide rules and elemental engineering had failed him. So, reluctantly—for he didn't like to ask help—he plodded toward the front of the building and slid the letter across the desk of Plant Manager Tobias Quint.

Toby's leather wrinkles shaped a smile at the missive bearing at its top the name of a business magazine. "Hm-m-m," said Toby. "Editor guy wants a story about your new method for sawing metal faster."

"He's got his nerve," Farr growled.

"Could be." Toby pursed his lips. He was looking at the letter again when Chuck barked:

"What we do is none of his business. I worked months on that thing. Now he wants me to spill it to the whole cockeyed world. But I didn't want to turn him down without letting you know."

"Well now, Chuck—" Toby rocked back, hands behind his head, and let his mind roam over the years since he had worked on a bench in the plant's baby days. "Maybe—" he finally said "—we shouldn't turn him down."

"Not turn him down?" Chuck came forward in his chair. "Listen, Toby." His fingers nervously tapped the desk. "My first loyalty is to Central Manufacturing. That metal cutter is cutting costs. Why should I give it to all our competition? On top of that I can't write a story. And if I could, I'd say something I shouldn't. And it would look as though I was crazy for publicity. The Old Man wouldn't like it. The rest of the staff would think I was trying to throw my weight around. They'd all be sore. I would hurt morale. I—I—"

"Maybe you'd better stop right there." Toby laughed. "You've sure got a case. The judge would have to give you the decision—if there wasn't any other side to it."

Chuck stared at Toby. "You mean—"?

Toby smiled. "There's generally two sides—to everything. When I'm done, if you still want to turn down the request, it's OK with me. After all, the metal cutter is your baby."

Chuck felt as though he were being asked to offer one of his children for adoption. However, curiosity as to what other side there could be to the case was strong and he leaned back with an "OK."

"For openers, Chuck—" Toby lifted off his glasses and laid them on the desk "—it's natural to want to keep methods a secret. But—it can't be done. I feel about competition just as you do. Why make it easy for them?

"However, sooner or later *everybody* will know about *any* method in this plant. It could even be some guy who copied the method wouldn't be so secretive and then maybe *he* would get credit for having originated it."

Chuck grunted a surprised "Humph."

"Some things you can patent and protect," said Toby. "Chemical formulas can be kept under wraps —for a while at least. Even those, some smart bird generally cracks. But a method?" Toby shook his head. "Experimental rooms and research labs we lock up, but as soon as a method comes into use in this country, it's practically public property.

"Now—" Toby aimed a finger at Chuck "—this is basic—in life: If you *know* you're going to do a thing, it's smart to act as though you were *tickled to death* to do it.

"So, since everybody is going to get to know about this anyway, sooner or later, why not tell the guy he can have his story, that you're quite happy about it, and that you'll cooperate in any way you can to help his wonderful magazine? He might even believe you. And—some day he'll hand you something from some other fellow."

Chuck slowly shook his head.

"Toby," he said, "you could sell eggs to hens."

Toby laughed. "This story is good business, Chuck. It will get some publicity for both you and Central, which won't do either of us any harm. It will lift us both above the common level. Instead of the rest of the gang being sore, they'll be proud of you. The Old Man will like it—a lot.

"This non-secretive attitude is characteristic of American industry," Toby added. "Europeans can't understand it. But with it we have out-stripped the world. We have pooled knowledge. We are cooperatively competitive. Maybe Kipling, I think it was, had something when he wrote that competitors had copied some guy all they could, but they couldn't follow his mind so he left 'em sweatin' and stealin' a year and a half behind. You can do what you want to, Chuck, but—"

"OK—" Chuck reached for the letter "—the hen buys some eggs."

"I know what it means to a lonely soldier in a strange land to have around him something that means home, something that brings him closer to those surroundings and those people with whom he has lived—where his heart is.

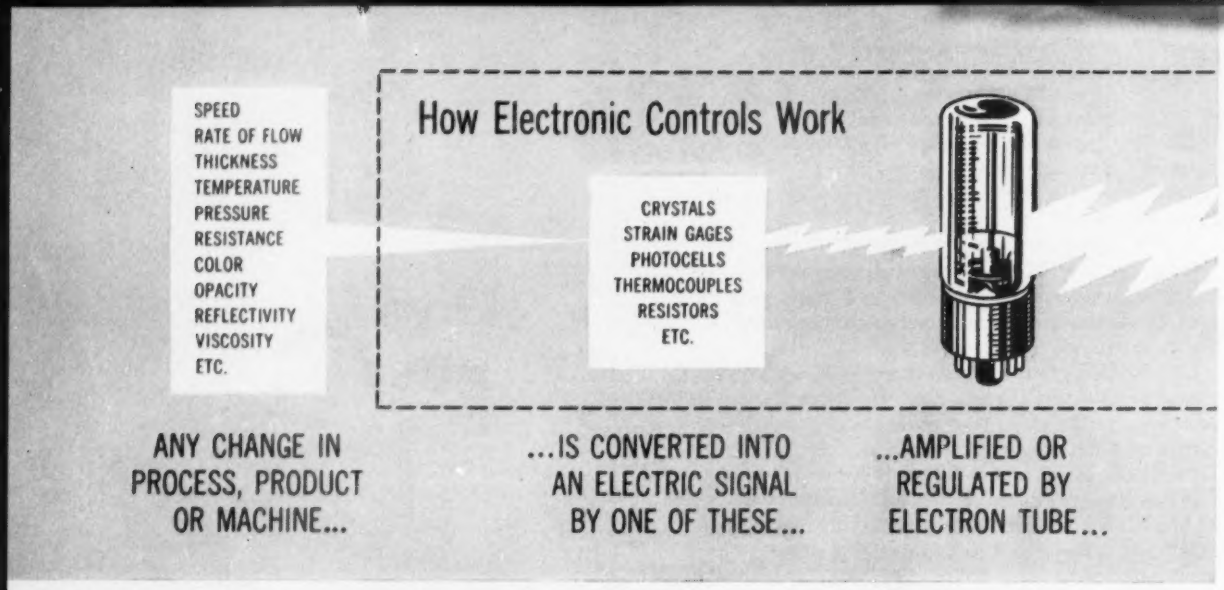
"When peace comes, don't let anyone tell you the need for USO will be lessened."*

—Dwight D. Eisenhower

•

*USO is just one of the 18,500 services that receive support from United Community (Red Feather) Campaigns. Each community picks its own date, but October is the traditional Red Feather month.

So it's not too early to figure out how your plant can cooperate. For good patterns to follow, see Fairchild Aircraft's plan (p. 121, August FACTORY) and Warner & Swasey's "Effective Employee - Contribution Drive Without Hoop-la" (FACTORY, Sept. 1952, p. 104).



WHAT YOU NEED TO KNOW ABOUT Electronic

A timely report without a technical term in it.

Timely because electronic controls can do . . .

. . . some jobs better than anything else can.

. . . some jobs nothing else can.

That's why you need to know . . .

. . . where you can use electronic controls (p. 120).

. . . how to make sure your electronic equipment will do what you want it to (p. 122).

. . . how to get full value for the dollars you spend on electronic equipment (p. 124).

. . . how to keep electronic controls in good running order (p. 125).

By NORMAN WEISSMAN • Assistant Editor, FACTORY

What is electronics?

Take electricity. Add the vacuum tube and the circuits that go along with it. And you've got electronics. Nothing more nor less.

Electronics can look pretty complicated, may even *be* pretty complicated—until you learn a few basic fundamentals. But remember: It's just a branch of electricity—a relatively new one and a plenty useful one for you. Don't think of it as a completely new science mixed with hocus pocus you'll never understand. Get it out of the clouds.

What electronics can do

• **When you need a control to operate with the speed of light . . .**

. . . **consider electronics.** It even works where signals have to change several billions of times a second.

• **When you want a control that's super-sensitive** to the most minute change in your process, product, or machine . . .

. . . **consider electronics.** The electron tube amplifies the faintest change to the point where it can do useful work in controlling an operation in your plant.

• **When you need to duplicate**—or go far beyond—the human capacity to see, hear, smell, feel, or taste for quality control or inspection purposes . . .

. . . **consider electronics.** A properly designed circuit can convert the sense to an electrical signal that does the work.

• **When you want remote control** of many operations from a central station . . .

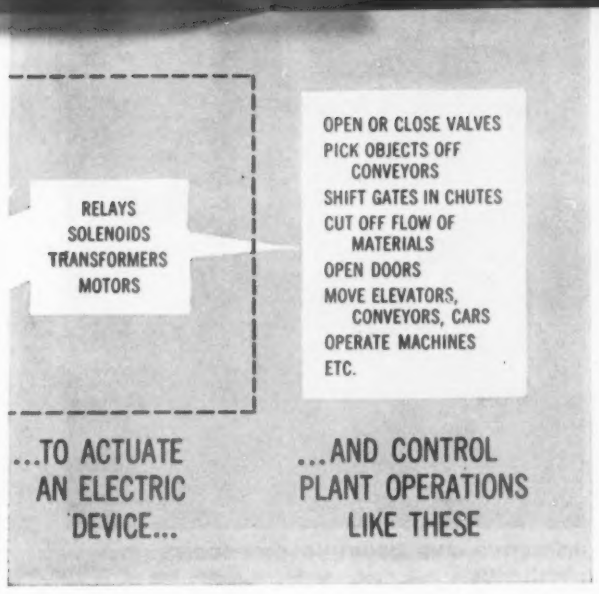
. . . **consider electronics.** Signals can be sent over long distances to control operations at a great number of remote points.

• **When you need extreme accuracy** that can't be obtained with electrical or mechanical controls . . .

. . . **consider electronics.** Electrons are weightless. There's no mechanical wear of contacts to limit accuracy.

• **When you want to control an operation that just can't be controlled any other way . .**

. . . **consider electronics.** Chances are there's a way to do the job electronically.



Controls

Why you'll be using electronics more and more

Take a look at your own plant. You may have some electronics equipment. If you do, chances are you'll have a lot more over the next few years. If you don't, better get ready. Electronics is coming your way. You can't escape it because . . .

• **Electronic controls can often do a job cheaper and better than other devices.** Take an electronic welding control. You control a quantity of current over a precise time interval. Only with electronics can you get the fast reaction you need with no time delays. You can't afford to overlook the possibility of using electronic controls to cut operating costs. May take a little trouble to get ready today for tomorrow's needs. But it's better than waiting for your competition to force you into action on the double.

• **Electronic controls are extremely versatile.** For some of today's applications, see the next two pages of this article. They vary from electronic balancing to sorting operations. For tomorrow's applications—it's up to you. Just use your imagination. There are applications unlimited.

• **Electronic controls can do many jobs that just can't be done any other way.** Continuous quality control by color, for example. There are lots more places where you'll need electronics to get the job done.

To learn how industry is using electronic controls, turn the page

But (you ask) are electronic controls all they're cracked up to be?

1. How can I be sure the control is going to be properly designed for my needs?

Some plant people say: "That's just it. You can't. The control manufacturer's design guys just don't know our problems. Lots of them have never been inside a plant. They don't even know the first thing about mechanical design. We just have to pray we'll get what we want—and then be ready to make lots of changes when the equipment gets to our plant."

Electronic control manufacturers say: "We can't give the user what he needs if he doesn't tell us his requirements. We never know whom to see for the specs in the plant. And very often some plant man gives us the wrong dope. That's not our fault."

FACTORY says: "Both are right. See page 122."

2. Can I really rely on electronic controls?

Some plant people say: "Better not. You never know when a tube or component is going to conk out on you. Stuff's often too finicky for our purposes. And downtime is darned expensive."

Electronic control manufacturers say: "This so-called poor reliability is often the user's fault. For months the control works perfectly in his plant, saving enough to pay for itself several times over. Then maybe he misuses the control, has some trouble, and blames us. Actually, there's plenty that plant people can do about reliability—if they'd only take the trouble."

FACTORY says: "Both are right. See page 124."

3. Won't I have trouble keeping electronic control equipment running?

Some plant people say: "Sure will. Never saw anything so complicated. Rats' nests of wiring. No end to the circuitry. And, on top of that, half the time we get wiring diagrams and manuals that leave us completely confused. How are we supposed to keep the stuff running?"

Electronic control manufacturers say: "It's up to them to get properly trained people and to follow simple rules of good maintenance practice. Which they don't."

FACTORY says: "Both are right. See page 125."

How Industry Is Using Electronic Controls

IN ELECTRONIC HEATING

- Induction heating
- Sterilization, pasteurization, dehydration
- Gluing and drying
- Dielectric heating, drying, and curing

IN PROCESS CONTROL AND REGULATION

- Electrostatic precipitation
- Induction heating
- Door opening
- Motion initiating, limiting and stopping
- Motor speed
- Application of paints and coatings
- Synchronization of power lines, generators
- Temperature control
- Timing control
- Welding control
- Relaying
- Humidity control
- Elevator leveling
- Control of flow of materials and fluids
- Control of moisture in materials
- Control of color, reflectance, and gloss
- Fluid and gas pressure control
- Frequency control
- Acidity control
- Voltage regulation
- Skew regulation
- Speed regulation
- Slack regulation
- Voltage, current, and phase regulation

IN POWER CONVERSION

- Electroplating and electrolytic processing
- Rectification
- Frequency conversion
- Inversion

IN COUNTING, SORTING, WEIGHING, INSPECTING

- Inspection
- Counting
- Flaw detection
- Sorting and grading
- Insulation testing
- Metal detection and removal
- Surface analyzing
- Automatic weighing
- Automatic gaging

IN MEASUREMENT AND ANALYSIS

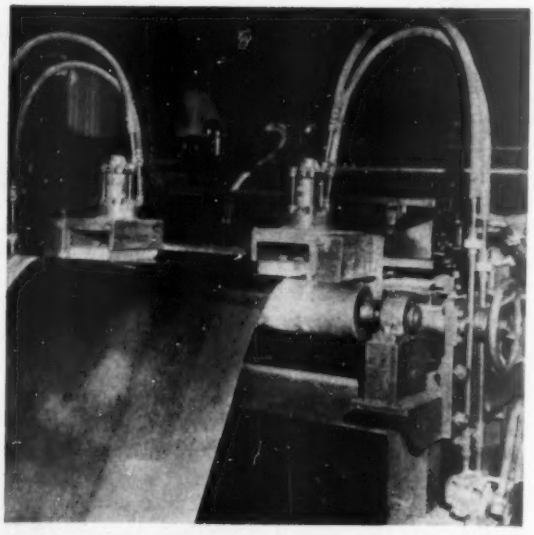
- Machine balancing
- Capacitance measurement
- Color measurement, analysis
- Current measurement
- Measurement of density, opacity, transparency
- Flux measurement, analysis
- Gas detection and analysis
- Humidity measurement
- Light intensity measurement
- Noise analysis
- pH determination
- Pressure of gases and liquids
- Reflection measurement
- Speed measurement, analysis
- Smoke detection, measurement, recording
- Sound level measurement
- Strain measurement
- Thickness, distance, and displacement
- Time recording and measurement
- Hardness measurement
- Vibration analysis
- Chemical analysis

IN SAFETY

- Combustion failure
- Liquid overflow protection
- Automatic stopping of machinery
- Intrusion alarms
- Under and over voltage alarms
- Fume detection
- Miscellaneous alarm devices

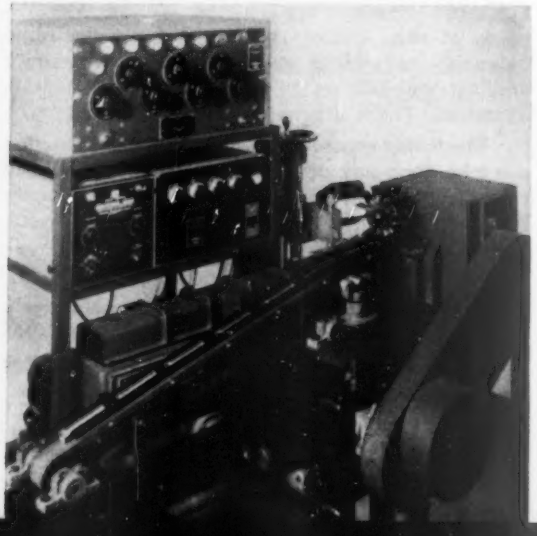
Text resumes on page 122

INSPECTING AND COUNTING CAN BODIES. Electronic control device is built right into the production line.

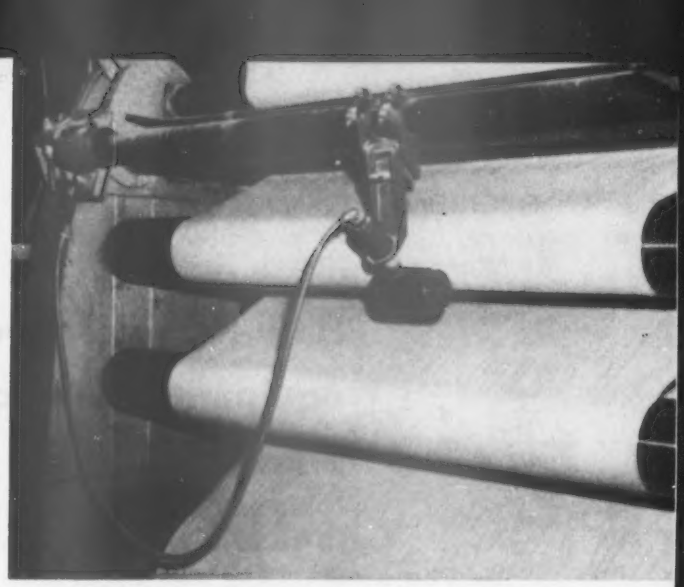


SEARCHING FOR PIN-HOLE FLAWS in tin plate on electrolytic cleaning and shearing line. Device also marks defects.

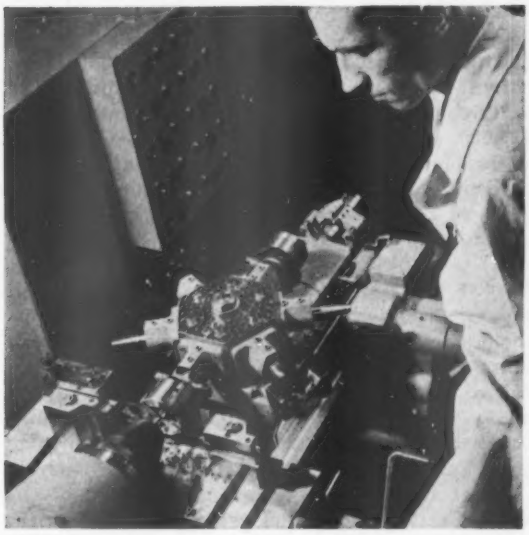
AUTOMATICALLY GAGING AND SORTING automotive wrist pins into good, oversize, and undersize classifications.



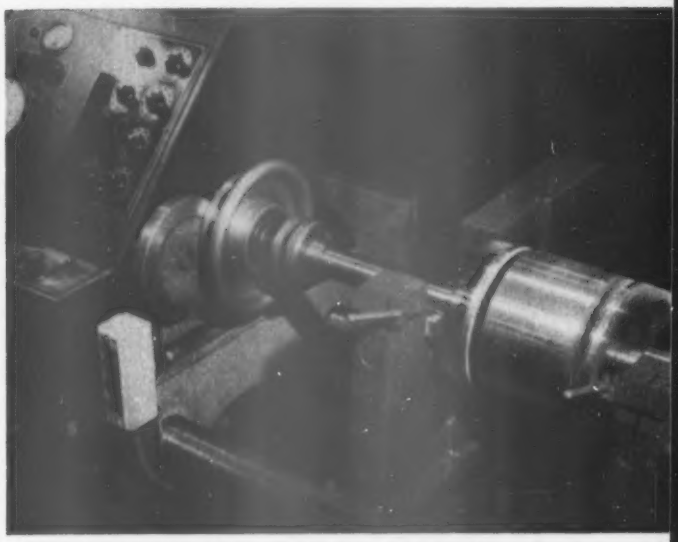
PROTECTING HANDS from dangers of punch press. If electric eye beam across danger zone is broken, press won't work.



CONTROLLING MOISTURE in paper. Detector is an electronic circuit sensitive to moisture picked up by small roller.

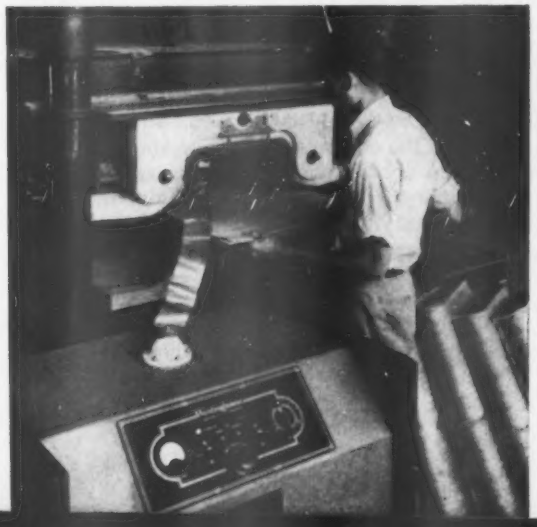


RUNNING A TURRET LATHE. Electronic motor speed control device can control speed, feed, dwell time, and indexing.

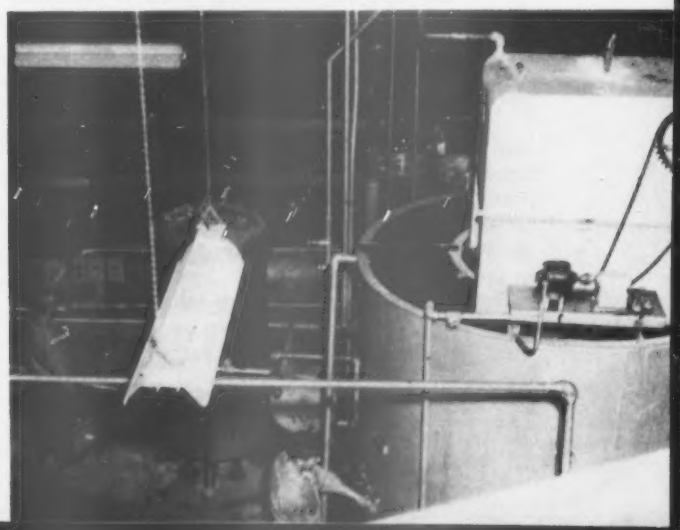


PRECISION BALANCING of armatures with this electronic unit is 8 to 10 times faster than mechanical balancing.

ELECTRONICALLY BONDING three plys of wood by pressure and dielectric heat in manufacture of radio cabinets.



CONTROLLING LIQUID LEVEL. Metal probes project into tank at two levels to control start and stop of pump operation.



How to make sure your electronic equipment will do what you want it to do...

Here's the typical situation when a plant buys a piece of electronic equipment:

THE IDEA · The plant has a problem. Someone in plant management sends an inquiry to an electronics manufacturer based on what he's read or heard about a piece of equipment that will solve the problem. Or a manufacturer's representative calls on the plant to suggest solutions. (A manufacturer's representative is a sales-service organization that represents one or several manufacturers.)

DESIGN · Your plant methods and design engineers are convinced electronics is their solution. They don't even consider other possible methods. So they begin to work with the manufacturer on getting a machine to do the job. Your methods and design people aren't worried about what happens once equipment is installed. That's *your* problem.

THE TROUBLE · So far the people responsible for operation and maintenance haven't had much to say about the equipment they're going to be using and maintaining. No one told them their opinion was of great importance in the purchase of electronic equipment. No one ever told them that they could contribute many worthwhile suggestions even if they didn't know a great deal about electronics. **But the fact remains that . . .**

. . . if the equipment won't work properly under tough conditions that weren't taken into consideration when the equipment was designed . . .

. . . if the equipment cost too much to maintain as a result of poor design for servicing or preventive maintenance . . .

. . . if the equipment cost a fortune more than you thought it would . . .

. . . you may be to blame for not insisting on getting in on the writing of specifications. No one knows more about your operating and maintenance problems than you do. You can't expect the manufacturer to know whom to see for what. It's up to all operating people involved to have their say in specifying the equipment.

Here are ten suggested ways—one *don't* and nine *do's*—to make sure your electronic control equipment will do what you want it to:

1. DON'T USE ELECTRONICS if you can do a job as efficiently and cheaply other ways. Use a knife switch rather than an electronic control—if it does the job just as well. It's just a question of economics. Simple, but too many companies fail to realize what a cost-saving consideration this is.

One company needed a simple device to detect hot rod from a rod mill as it passed through a tube before winding. An electronic rod detector was ordered. It was specially designed, cost about $15,000, and never did work properly. When one of the plant workmen heard what the trouble was he came up with his own rod detector—a simple piece of pipe with a bend in it. It cost next to nothing and worked perfectly.

2. BRIEF THE MANUFACTURER · Let him in on all factors that might affect operation of the equipment. It's a tremendously difficult job even for experienced design people to decide on a set of specs for equipment in an industry they know pretty well. Plants vary in layout and methods. Equipment that works perfectly well in one plant may need lots of modification in another.

What are some of the factors? Number of operating shifts, union roles, whether it's customary to maintain building temperatures over non-operating weekend periods, power supply fluctuations, industrial habits of the people who install the equipment, kind of waste in the atmosphere where the equipment is installed, how often the equipment is turned on and off, kind of people who will maintain and test the equipment. Those are just a few of them. And you and other members of the plant operating group are the only ones who can give the answers.

3. TELL THE MANUFACTURER exactly what you want to do with the equipment. In some applications the equipment needs to be especially rugged or sensitive. But if the user doesn't tell the manufacturer exactly what those equipment requirements are, as he frequently does not, the equipment can't be properly designed.

On the other hand, don't ask for more reliability, sensitivity, or ruggedness than you need. Try to eliminate unreasonable demands. Get what you

need, sure. But need what you get. It may cost you ten times as much, say, to get a control ten times as sensitive as you need. Take an electronic scale, for instance. Why insist that it be accurate to 0.01 oz. when weighing 100-lb. sacks of potatoes?

4. OFFER MAINTENANCE IDEAS to control builder. Time to think about maintenance is when the product is on the drawing board. And don't forget: Design people don't know your problems, never will—unless you tell them. Very few have had plant experience, don't know your everyday maintenance problems.

What to look for? Here are some of the things:

- Reasonably dust-tight enclosures.
- Easy accessibility of parts for lubrication.
- Recognition of the moisture problem, due to condensation from alternate heating and cooling of the equipment.
- Uncrowded component boards that give plenty of room for servicing individual parts.
- Secure mounting of components. And fittings that take the strain of repeated installation and removal.
- Built-in test terminals and meters to aid trouble-shooting.

5. GET STANDARDIZED CIRCUITS if possible. Then your basic designs will be interchangeable. It will be lots easier to get replacement tubes and parts. On the other hand, when you get those one-of-a-kind circuits, chances are you'll be using one-of-a-kind components, too.

It's easy enough for the equipment manufacturer to get the parts. But you'll have trouble in your own locality. After all, why should a parts supplier stock your part when you, exclusively, need only one a year?

One aircraft manufacturer wasn't able to get special rectifier tubes for his boring machines. The company just couldn't get the machine to work until a replacement part was tracked down in a far-off town. "Not only that," says the user, "if a standard circuit had been used, the maker could have thrown out half the tubes in the device." Your circuitry that's not standardized is untried, may have plenty wrong with it. Why should you field-test it when you probably don't have to?

6. SUPERVISE TESTING of the equipment in the manufacturer's plant. Faults in design will quickly show up. Dummy loads allow you to "play around" with the control to see how it operates under a wide variety of conditions. It's even better than in your own plant. You can't "play around" there, where it's "for real."

Manufacturers will usually cooperate on this. Best people to send are those who are in charge of day-to-day maintenance. It will give them a good chance to go to work with the manufacturer's experts before they're on their own.

7. IN WRITING SPECS, don't be afraid to say that you don't know exactly what you need. If you don't know, somebody will. Sometimes an operating man may be unwilling to say he doesn't know, and specifies the wrong thing. Get the right crowd together and you won't have any worries. You can't expect the manufacturer to give you what you need if he doesn't have your requirements 100% correct.

8. ASK FOR PLUG-IN unitized construction where you have critical components that often need replacement. The military used them in great numbers. It was easier to train a soldier or sailor to plug units in and out than it was to teach him electronics theory. But the same philosophy doesn't always work in industry. It results in a big spare parts inventory that you can't afford. You may be protecting yourself into bankruptcy. If you do use plug-ins wisely, however, you can save many hours of downtime. Plug-ins of a given manufacturer will generally be standardized.

Use them particularly . . .

- When the equipment is absolutely critical to your production operation. That's the only time they're really practical for you. For the final decision, you'll have to compare the added cost of spare parts with cost of excessive downtime.
- On those parts that are most subject to failure. Your manufacturer can give you this information. This way you don't keep big inventories of parts that are ordinarily good for long periods.
- Where your entire control can be removed quickly when faulty, so that a manual control can be spotted in while the electronic control is being serviced.

You'll find, though, that some electronics manufacturers are dead against plug-in construction They feel they don't get the kind of solid connection they need for certain types of equipment. They rely on test terminals and meters to aid troubleshooting and to emphasize spots that need watching.

9. EVEN IF YOU'RE BUYING a machine tool with the electronic control already installed by the machine tool builder, don't miss the chance to let your control requirements be known. Typically, you used to buy a machine tool in one place, a motor in another, and a motor control in a third. Now you buy all three in a single package—from the machine tool builder. He won't always check back with you on control requirements. When the machine tool builder submits a bid, he quotes as low as possible. He just can't afford to specify "optimum controls." And you can't expect the control manufacturer to do it. He doesn't even know who the ultimate user is going to be.

To learn how to get your money's worth when you buy electronic equipment turn the page.

How to get full value for the dollars you spend on electronic equipment

Know your equipment . . .

. . . for there are two major kinds you'll be using for control:

COMMONLY USED EQUIPMENT — like induction and dielectric heating machines, electronically controlled welders, d-c motor controls, and small electronic devices such as some timers and photoelectric relays. They're accepted in industry, have been for years. They're highly reliable by nature because many of the design and operating bugs have been ironed out of the equipment by long experience.

SPECIALLY DESIGNED EQUIPMENT for your particular application. It may serve in quality control to hear, see, sniff, touch, or taste, and in general double for the senses. Or it may do counting, sorting, or inspection in other tailored applications. This type is not always standardized. It may be one of a kind. *You* may actually be doing the "field testing." It stands to reason that you'll have a little more to worry about with this equipment as regards reliability.

. . . and make sure that it is completely reliable

1. DON'T MISUSE IT · Use the control only for the job it was originally intended to do. It is especially built to meet specific needs. Change the job and you often have to change the control. If you don't, you may ruin your control, your machine, or your product. If you do want to make a change, be sure to consult your manufacturer.

2. DEMAND THE BEST that can be had in components and tubes. It doesn't pay to try to save money there. The difference in cost between the best and less than the best is insignificant compared to what continual servicing and replacement of poor components may cost. Highly reliable tubes and components can be had—if you're willing to pay a little extra for them.

You'll find that tubes guaranteed for 10,000 hours of service are now available. And as a result of many years' experience in manufacturing to extremely rigid military specs, electronic manufacturers are getting more and more reliability into components. New developments such as transistors and magnetic amplifiers will make possible great forward strides in reliability of control equipment.

There are ways to insure reliability, too. Don't overload your tubes. Make sure they have adequate cooling. Avoid using vacuum tubes without previous "burn-in."

Today, some tube manufacturers are burning-in tubes for periods as long as 2000 hours. Reason: The longer a tube has been operated—up to a certain point—the more indication you have that the tube is a good one. It is during the first critical hours of operation that tubes fail—if they are going to fail early in their operating life. If your control has been operating satisfactorily, then fails, better check twice before you replace any tubes. Chances are your replacement will not be as good a tube as the one you've thrown away. The old tube may be failing because of something that needs fixing in the rest of your circuitry.

3. DEMAND THOROUGH TESTING of equipment under conditions that are similar to your own operating conditions. You wouldn't be impressed by a 100-mile automobile test over a flat superhighway. That's not typical driving conditions. You'd want the car to get "the works." So automobile manufacturers really make sure a newly designed model gets just that. Why not the same thing with your electronic control equipment? Instead, you find that equipment slated for tough industrial service is often tested under ideal operating conditions in the manufacturer's laboratory. He'll have an air-conditioned, clean, humidity-free atmosphere. His voltages will be carefully regulated. The design bugs are not going to show up there. And you'll be saddled with the operating problems that arise.

4. MAKE SURE your manufacturer has design people who understand operating problems. Many of today's electronics engineers know too little about mechanical and electrical design. But, in industry, control failures are most frequently due to faults of a mechanical or electrical nature. A relay that sticks after a few thousand operations can't be blamed on electronics.

The electronics design engineer who has spent most of his time on radios and other communications equipment can't be expected to make a quick switch to designing industrial controls—without serious results for you.

Electronics manufacturers know there's a big gap to be closed between the knowledge of their designers and the needs of the industrial user. One company is even demanding that its design people spend 20% of their time on the production floor in their plant, learning about plant operating problems. But there's still a long way to go before the gap is closed. You can help close it— and get better equipment as well—by insisting on design people who can talk your language.

5. GET A RUGGED CABINET for your equipment. It's for use in a plant, not a parlor. Yet much of the industrial electronics equipment looks too flimsy for factory gear. Remember it has to stand up under vibration, possible knocking around, long hours of continuous operation. The cabinet is the only protection for the precision parts inside.

Another important point: You'll have a hard time convincing plant people that electronics is good medicine if the equipment doesn't look rugged enough to withstand plant treatment. It's a kind of psychological approach to reliability. It's got to look—as well as be—reliable.

6. INSURE PROPER HANDLING of equipment when transported from manufacturer to your plant. The manufacturer doesn't always know how the transporting agency will handle the equipment, and may not design it to withstand the treatment it gets. And hidden damage from this kind of cause can be more serious than obvious breakage. Rubber parts that act as shock absorbers become brittle in cold weather and may not be able to prevent damage to the equipment. Also, design and packaging must be able to withstand rain, snow, dirt, hard knocks and the like, to which equipment is exposed in the plant receiving yard before installation.

7. GET IT INSTALLED RIGHT · A piece of control equipment has to be engineered in its installation just as it does in its design and development. Such a simple thing as the grounding circuits can often bring on future problems that affect accuracy — and even life — of components. Heavy power currents in the ground of electronic equipment can cause enough electrical noise to affect reliability seriously.

Location of the equipment has to be engineered, too. It's easy to make the mistake of locating the equipment in a hot spot where the high temperature exceeds maximum limits of your components. Humidity and fumes are another cause of trouble.

What can you do? Either get components designed to stand the ambient conditions or locate the equipment where such conditions don't arise.

8. KEEP UNAUTHORIZED HANDS OFF your equipment. Your operators should be told specifically, and continually reminded, not to touch the controls—even for slight adjustments. That's one way to throw the entire device out of whack. The equipment doesn't have much of a chance if just any frustrated radio engineer can get inside it to make operating adjustments. Some users have so strongly felt the need to keep unauthorized hands off that they've located the control in a spot inaccessible to all but qualified technicians.

9. DON'T INSTALL ADDITIONAL EQUIPMENT in the vicinity of your electronic controls without first checking with competent design people. Even if your equipment has been working perfectly, it may be greatly affected by changes in power supply caused by new power requirements. Photoelectric cells may cease to operate properly. Metal detectors and other devices with search coils may be ruined.

How to keep your electronic equipment in good running order...

By its general complicated nature—especially to people who have had no experience with it—electronics presents a big maintenance problem

Here are some tips on how to solve it:

1. SELL ELECTRONICS to your maintenance and electrical people before you bring in the electronic equipment. Take a typical electrical maintenance man: He's tops in the plant and respected for what he knows. But he doesn't know the first thing about electronics. And if he can't fix the electronic controls that are brought in, he's in trouble. What's more, if he accepts the equipment, there might be a lot more of it coming.

So what does he do? He makes a lifetime project of his opposition. He might try to make sure the equipment never worked right. He might "forget" to turn a switch on. It's a form of sabotage, sure, but it works—for him. And management probably won't believe that the fault is in the man. He's got an excellent record in electrical maintenance.

Here are some of the things you can be telling

your people that will help erase their fears of electronic controls:

• They ought to forget the "little black box" idea. Electronics is just a branch of electricity, and not as complicated as it seems.

• The equipment won't reduce anybody's reputation or worth to the company one bit.

• No man will be considered "stupid" if he can't fix the controls right off the bat.

• No one should be afraid to say he doesn't know. If he doesn't know, there's always a way to find out. If he doesn't know and says he does, there's a good chance that the equipment will be ruined when he tinkers with it.

2. GET ALL THE HELP you can from the manufacturer. His wiring diagrams and schematic drawings are not always helpful. They're frequently too big to handle, overly complicated, and confusing. And some makers' manuals are hard to understand and use. That's because they're written *by* electronics engineers *for* electronics engineers. So be sure to:

• Demand schematic drawings and diagrams that are broken down into easy-to-handle-and-understand sections. Manufacturers have them on hand. They use them as breakdown drawings for the factory assembly of your control. They could never build the control from the blueprints that are often handed their customers. Sometimes you'll want to further simplify the schematics on your own.

• Demand a manual you can understand. If the manual is not in that shape when you get it, be sure to go over it with the manufacturer and straighten out any points that baffle you. If necessary, rewrite it in spots.

One more tip: Make sure the manual gets into the right hands. It belongs with the man responsible for day-to-day maintenance of the controls. Very often, according to some manufacturers, the manual doesn't make it down the chain of command. It's not going to help maintenance much if it gets buried at the bottom of the purchasing department's files.

3. ENCOURAGE IDEAS ON improving equipment once it's installed. But don't let anyone actually make the changes without approval from your design department or your manufacturer.

Here's what happened to one user who didn't bother with approval: There was a five-minute delay circuit on his welder that operated when you started up the machine. It prevented the circuits from working until all tubes were properly heated up. The user shorted out this circuit to save the five minutes.

Result: A flock of tubes were blown.

4. GET ELECTRONICS-ELECTRICIANS in your electrical department — men who know basic theory. You need more than just someone who can follow orders. You want a man who can absorb new ideas and theories, and at the same time be an expert on the electrical side. Your purely electronics man may be able to fix the immediate fault. But it may be like painting over rust. He may have missed fixing the cause—which your electrical man can do. So in the end you need an electronics-electrician. And you'd be wise to start doing something about getting him right now. There are three ways you could go about this:

Train your own. Most users feel it's best to make electronics men out of electricals, not the other way around. *The reason:* It's easier to teach an electrician what he needs to know about electronics than it is to teach an electronics technician what he needs to know about plant electrical maintenance.

An ideal electronics-electrician trainee is a man who has had several years in plant electrical work with some background in amateur radio or possibly some training in military electronics.

If you need full-time electronics people to maintain a big control, however, you may be able to use men without plant experience who have a background in military electronics. They'll have one specific job that they can learn fast. That's what they had in the service. But for the general run of plant applications, your electricians—with a dose of electronics—would fit in best.

How to get them to want to become trainees? It may be a problem with the older electricians. They're already top electricians. Why should they want to learn something new? The younger men, though, will spark to it. They'll know it's the coming thing in plants, and that they have a big future in it.

It also helps to tack an incentive onto the electronics-electrician job. Some manufacturers have set up an entire new classification for the group, so that seniority doesn't push anyone out at the first layoff. It's a higher classification than Grade A Electrician. Unions have been going along with this new classification in several plants.

But seniority can be a problem. There are many cases where a company can't assign a qualified young man to electronics maintenance. It has to assign a long-service electrician who may lack knowledge of electronics. In a case like that, there's only one way out: Train everyone concerned in the basic fundamentals of electronics.

What kind of training? Some common ways:

• Basic electronic course. Both General Electric and Westinghouse, for example, offer packaged training programs that incorporate sound-slidefilms and literature. They're widely used in industry. Other special courses are available.

• On-the-job training. Once your men have the fundamentals of tubes and circuitry and know job breakdown procedures they can diagnose the trouble in equipment from the symptoms.

• Training from the manufacturer. In your plant or in the manufacturer's plant, this always pays. If training is in his plant, some distance from yours, you'll probably be sending only one or two men.

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Federal Products Corp., Providence 1.
General Electric Co.
Industry Control Dept., Schenectady, N. Y.
Electronics Div., Syracuse, N. Y.
Photoswitch, Inc., Cambridge, Mass.
Radio Corp. of America, Harrison, N. J.
Sperry Gyroscope Div., The Sperry Corp., Great Neck, N. Y.
Westinghouse Electric Corp., Electronics Div., Elmira, N. Y.
Wright Aeronautical Div., Curtiss-Wright Corp., Wood-Ridge, N. J.

There's some danger you'll be making "prima donnas" out of them. Depends on what kind of people they are. You'll know which ones to choose.

• Self-education program. This works in some cases, where your people have had some grounding in radio or TV practice. Just give them the necessary instructional material—maybe correspondence or night school courses.

Import 'em. If you don't have good potential electronic-electricians in your own plant, you may be able to attract them from other plants. There may be no future in electronics at their old job. So you offer training in electronics to help them get ahead. Once trained, these men can help teach others in your department.

Buy outside maintenance service. When you have trouble, you call the organization and it sends you a maintenance man who knows your equipment. Works well with smaller companies—where it may not pay off to set up a special training program. Ask your manufacturer whom he can suggest for servicing in your area.

But outside service organizations are not always the best way out for three reasons:

• They don't always take care of your trouble. They generally don't know plants. Like the electronics technicians, they'll fix your trouble and never find the real cause of it.

• They don't always take care of the trouble fast enough. Even if they do a good job of servicing, it takes time. And maybe you can't wait.

• They don't always practice good preventive maintenance. They're not in close day-to-day contact with your control, are less liable to do a good job than your own maintenance crew.

5. KEEP SPARE PARTS on hand or know where to get them fast. You should double-check when you buy your equipment to insure that parts are as easy to get as the manufacturer says they are. Also make certain that spares are perfectly matched with the parts you've been using. Even if two tubes have the same number and specs, there may be big operating differences between them.

It's a good idea to get yourself a reputable parts supplier right away. And buy the brands you know. The few cents you may gain in cost, you may lose many times over in reliability.

One more tip: Don't let other plant departments take your tubes or components. You may have just the parts that design engineering wants for a model it's trying out. A design engineer takes a few from maintenance stores. And when you want the tubes for replacement, they're not there.

6. KEEP THE RIGHT TOOLS and instruments on hand. For your electronic equipment, you'll need the proper kind of voltmeters, ammeters, oscilloscopes, tube testers, and the like. Your own maintenance gang will need them. And outside service people, when called in, may depend on your having them.

7. SET UP PREVENTIVE MAINTENANCE — if you want to cut equipment downtime to a minimum. And it's important to keep a written maintenance log showing results of routine tube and component testing. You can learn a lot about the deterioration of your components in service by looking at the log. And you'll be able to replace them before they fail. What kind of preventive maintenance? And what kinds of readings to take and record? Ask your manufacturer.

May pay to set up a group replacement program for tubes. Ask your tube supplier how to do it. You may find it cheaper to throw away some tubes after a good percentage of their operating life has been expended than to wait until failure. Tubes are cheap compared to cost of downtime.

8. ENCOURAGE TEAMWORK • Get your production people to cooperate with maintenance in keeping electronic equipment in good working order. One company's production force was paid on the basis of the quality of the product that met specs. Workers found that their earnings increased with the installation of an electronic control. So they were anxious to keep the device working properly. Workers taught themselves to look for trouble, called in maintenance at the first sign.

Result: Downtime was kept to a minimum in the plant. Other companies make a large charge against maintenance for downtime on electronic control equipment.

9. CONTROL AND MINIMIZE DOWNTIME on your electronic control devices. One user does it this way:

• If his welder is down more than two hours, maintenance calls in a foreman.

• If it's down half a day, the foreman calls the plant superintendent.

• If it's down a full day, the plant contacts the manufacturer for service.

By G. NELSON BROWN • Assistant General Supervisor of Methods and Plant Layout, Temco Aircraft Corporation, Dallas

Crew Charting Tells Workers

IT GIVES supervisors and assembly workers alike a running visual check of current production efficiencies on large assemblies. It has proved its worth at Temco Aircraft by . . .

. . . **cutting aircraft assembly costs.** Up to 80% on some individual assemblies.

. . . **raising morale.** It describes each operation in detail so that workers know exactly what to do. And it schedules work so immediate goals can be recognized and obtained.

. . . **eliminating indiscriminate transfers.** It organizes the job at the primary or worker level.

IT HAS THESE ADVANTAGES, tangible and intangible, because workers know what to do and when to do it. The crew chart establishes the sequence of operation, shows the standard time for each operation, and specifies the number of direct employees for each element of the job. Each employee has work scheduled by type and time throughout the job cycle.

CREW CHART "A" 11-21-52 DATE 2-3-53

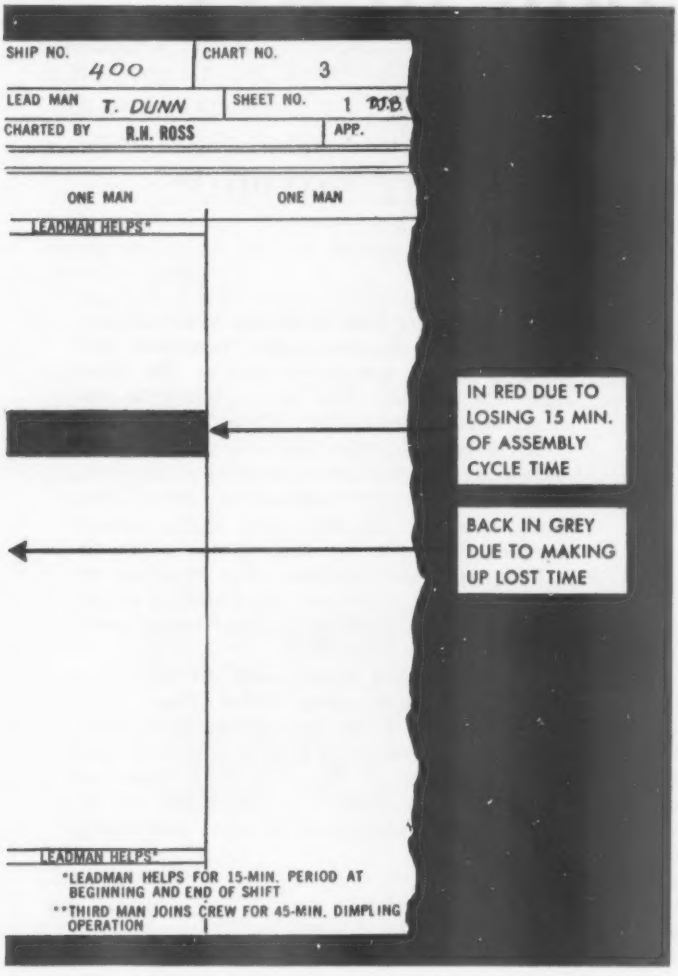
SUBJECT TAIL CONE FAJ, 2 JIGS DEPT. 73

PART OR ASSEMBLY NO. 5-31001-923, STA. #1, POS. #1 JOB #52

	MOVE RATE	START RATE	FINISH RATE	ONE MAN	ONE MAN
0	~~7:30~~				
	~~8:00~~		~~8:00~~	LOC. 1166, 1221 & K1212 FRMS. 30 min.	
	~~8:30~~		~~8:30~~	LOCATE INTERCOSTALS 30 min.	
	~~9:00~~		~~9:00~~	1. LOC. & DRILL LONG FILLERS 15 min.	
				2. LOC. LONG CLIPS & OK STRIP FOR PANELS 15 min.	
				LOCATE & DRILL PANELS, LOCATE —21 SKIN	
3				2 hrs.	
	~~11:00~~		~~11:00~~		
	~~12:30~~		~~12:30~~		
6	~~1:45~~		~~1:50~~	RIVET —13 —14 SKINS 30 min.	
	~~2:15~~		~~2:15~~	LOCATE, SCRIBE & TRIM —18 —21 SKINS 1 hr.	
	~~3:15~~		~~3:15~~		
				RIVET —18 —21 SKINS 40 min.	
	~~4:00~~		~~4:00~~	CHECK CONTOUR 1221 15 min.	
				DRILL AND ROUT FOR RUDDER STUB, INST. TUBE ASSY. & RUDDER STUB 1 hr.	
9					
				INST. RUBBER STUB, LOCK JIG & DRILL 30 min.	
				COMPLETE & SELL —18 SKIN, INST. —78 ANG. & —903 RIB 1 hr. 30 min.	
				STRIP BOLTS & REMOVE FROM JIG 30 min.	
12					

CREW CHART (above) lays out an entire day's work in advance for a crew like the one shown in the photograph at the left. Move rate and man-hour columns are colored gray to show job was on time up to 11:00 a.m.; red to indicate it was behind schedule till 1:45 (when lost time was made up); then gray again for the rest of the shift to show operation was back on schedule. Arrow in photograph points to crew chart.

What to Do, When to Do It


SHIP NO. 400
CHART NO. 3
LEAD MAN T. DUNN
SHEET NO. 1
CHARTED BY R.H. ROSS
APP.
ONE MAN
ONE MAN
LEADMAN HELPS*
IN RED DUE TO LOSING 15 MIN. OF ASSEMBLY CYCLE TIME
BACK IN GREY DUE TO MAKING UP LOST TIME
LEADMAN HELPS*
*LEADMAN HELPS FOR 15-MIN. PERIOD AT BEGINNING AND END OF SHIFT
**THIRD MAN JOINS CREW FOR 45-MIN. DIMPLING OPERATION

How charts are developed

Industrial engineers set up the time standards and the optimum number of employees per jig for each operation. Then they established the proper operational sequence to get maximum assembly efficiency. These data were placed on the crew charts.

Of course, the nature of this work requires the use of learning curves to adjust standards for increased production efficiency, as the worker gains efficiency. When number of assemblies completed reaches points where the learning curves call for new standards, jobs are re-charted in accordance with revised time allotments.

How charts are used

Daily the leadman posts a new chart filling in date, ship number, and his name. He notes the time the job was started under *move rate* and the time it actually started under *start rate*.

As each operation is completed, the leadman enters the *finish time*. Then, depending on whether the job is on schedule or not, both in respect to *move rate* and cycle time, he colors the *move rate* and *man-hour* columns gray or red.

The colors and figures give an up-to-the-minute picture of job status and permit quick checks on production schedules. Their significance is illustrated by the example chart.

In this chart the first operation starts at 7:30 and is completed on schedule at 8:00. The *move rate* and *man-hour* columns are colored gray for this period.

The second operation starts at 8:00, is completed on schedule, and the appropriate columns are colored green. The job goes along fine on the next two operations also.

There have been no delays up to this point. But now see what happens.

A loss of 15 minutes occurs during the operation scheduled to be completed at 12:15. (The half-hour lunch period from 11:20 to 11:50 is not included in cycle time). The time from 11:00 to 12:15 is colored red in *man-hour* and *move rate* columns. For the same reason the operation from 12:15 to 1:45 is also in red.

By 1:50 the lost minutes have been regained. The operation is now back on schedule. This calls for coloring the columns gray after 2:00.

In crew charting all operations are interlocking. In the above chart, when the third man is not required for dimpling on this particular assembly, he is working on similar jobs on other assemblies.

Once the daily chart has been completed, it is filed by the foreman to provide a permanent record he can use to study part operation efficiencies.

The original crew charts were made up by industrial engineers. Temco now encourages production supervisors to make them out.

TIPS TO GOOD HUMAN RELATIONS for factory executives

PHOTOGRAPHS TO HELP RECRUIT Not many of the kids coming straight out of high school have ever been in an industrial plant. One way to give 'em an idea of what it's like in a plant, and what particular jobs are like, is to use photographs. An attractive brochure, mostly pictures, is helping Thompson Products of Cleveland recruit ambitious young grads for its apprentice training program. Job is good enough so that even Eastman Kodak is bragging about it. Copies are sent to all high schools in Thompson's recruiting area.

BOSSES, UNION MEET MONTHLY AT 19TH HOLE Ordinarily, FACTORY doesn't present two "Tips" from the same company in two consecutive months. But after misspelling the Fischer & Porter Company's name in August, *now* seems to be the time for this item:

Once a month, F&P executives and union officials have a dinner and informal discussion at the local country club. Company president, human relations director, union president, and union secretary are regular diners. The other eight are rotated. They get a chance to talk about anything of mutual interest.

But here's the hitch: F&P has an independent union. In that situation, such informal meetings could smack of "company unionism." They don't, however. In fact, they can't, because complete "minutes" are kept of the discussions.

And here's the gimmick: The complete report of the discussion is in the hands of all supervisors and all union stewards before work starts the following morning.

It's all open and above board. Because it's a free-and-easy atmosphere rather than a bargaining table or grievance meeting, tough problems can be thrashed out without bitterness. And because it's not an official meeting, there's no speaking for the record or worry about an offhand remark coming back to haunt you at contract time.

NEW JOB TITLE MAY UP QUALITY LEVEL Ever run across the title of "customers' representative" for the quality control chief in a plant? Not often, we'll bet. The few places we've seen it, the companies feel it adds to the stature and importance of the quality program—especially in the workers' eyes. Lets 'em know that quality is demanded by customers, is needed to protect sales. Just a gimmick, but it can take some of the curse off quality control men and inspectors who are frequently regarded as first-class production bottlenecks—if not knuckleheads. We ran into it most recently at Homestead Valve Manufacturing Co., Coraopolis, Pa.

TRAINING FILMS IMPROVED BY COLOR AND STEREO? The Navy has done some interesting research on the extent to which use of color film and stereoscopic (3-D) projection jack up the efficiency of movies designed for use in training programs. You may be in for a few surprises (generally, color is no better than black-and-white; 3-D excels on certain jobs) if you read the reports on these studies:

"Relative Effectiveness of Color and Black-and-White in Instructional Films." PB111095.

"Effects of a Stereoscopic Sound Motion Picture on the Learning of a Perceptual-Motor Task." PB111143.

Cost of the reports is 50¢ each. Be sure to state PB number and order from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C.

UMBRELLAS ON LOAN In most plants, employees caught unprepared for a downpour at quitting time just plain get wet on their way home. Not so at National Cash Register, Dayton.

Seems NCR runs an umbrella lending service for employees. Comes the rain, and Bill (or Mary) simply gets an umbrella requisition from the department clerk. It's used like a tool check. The duplicate copy is exchanged for an umbrella at the gate.

There's no charge to the employee—for the first 24 hours. After that, 5¢ a day. In case of loss, charge is $2.75 for man's umbrella, $2.50 for lady's.

NCR keeps a supply of 6150 umbrellas on hand—5000 black ones for men, 1150 blue or patterned ones for ladies. Each is marked "NCR" in 2-in. letters on the inside cover. Company's annual cost for repairs (done by an outside firm) is under $500.

Is collecting for losses a problem? No. Probably because the employees really appreciate the service, loss runs to less than a dozen umbrellas a year.

FIRE DANGER IN DECORATIONS FOR PARTIES Any time you get involved in putting up trimmings for a shindig in your plant (or in a rented hall, theater, etc.), keep an eye on the potential fire hazard. A spark from a machine —or cigarette—can touch off a festoon of crepe paper or a Christmas tree in nothing flat. Even beyond using your common sense in such safety precautions, be sure to check local fire codes and ordinances. Some of these regulations are pretty stiff.

SAFETY TRAINING PAYS DIVIDENDS OFF THE JOB, TOO It's an old saw that a worker is safer *on* the job than *off*. At General Motors, for example, a 12-month study showed 4 lost-time, on-the-job accidents for each 1000 employees. Off the job the figure was 22 per 1000. But—and here's how GM's safety training appears to pay off around the clock—the off-the-job accident ratio for all industrial workers in the same period was 44 per 1000. It's an important added value for your safety program: *Keeps healthier, better-producing workers on the job more regularly.*

While on the subject of safety, DuPont's Old Hickory rayon plant (3500 employees) deserves a salute for hanging up a new world's record: 28,160,000 man-hours over four years without a lost-time injury. And it's still adding to that total. Previous record holder was DuPont's textile fibers plant at Martinsville, Va. We're sure DuPont has no monopoly on good safety practices and would welcome keener competition. So would employees who will become "statistics" in an accident rate.

AEC GIVES UP ON LIE DETECTOR After eight years, the Atomic Energy Commission has decided that lie detectors aren't very effective after all. They will no longer be used, except on a voluntary basis in a few special cases. AEC found adverse effect on morale "substantially outweighed the limited advantages," which were almost exclusively in detection of pilferage.

From Procter & Gamble's newest lab...

10 New-Plant Ideas

But you don't have to build a *laboratory* to use them. Or even your "factory of tomorrow." Any new plant building will do. Because here, from Miami Valley Laboratories, in the large economy size, is a package of ideas that "belong" in *any* discussion of future building plans. For instance:

U SHAPE · Allows expansion of any department, either separately or with others.

MODULAR LAYOUT · Modules are 11x24 feet in labs, 12x18 feet in offices.

EMERGENCY EXITS · A fiberboard panel 2x3½ feet in one wall of each lab can easily be kicked out, permits escape in case the door can't be used.

TRACER LAB · Set aside for handling radioactive materials. "Strippable" paint on walls and ceiling can be peeled off when geiger counter shows too much radioactivity.

HIGH-PRESSURE LAB · It's walled with boiler plate. Ceiling has a 10x20-ft. panel of light metal deck. An explosion would blow out panel, but leave walls intact.

PROMENADE DECK · Employees can relax on terrace overlooking the Great Miami River.

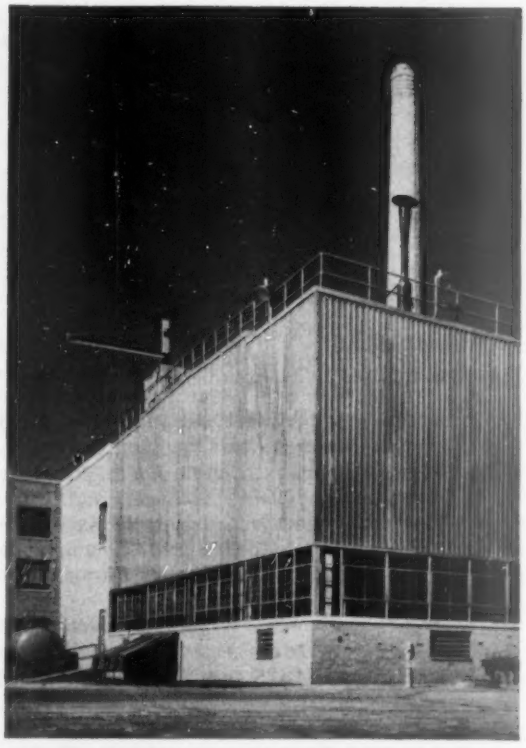
AIR CONDITIONING · Five separate units serve the building—even the maintenance shops. Only the pilot plant and storage, incinerator, and boiler rooms are excluded. In addition, special units operate around the clock in the animal, spectro, and tracer labs.

SUPPLEMENTARY FIRE CONTROL · Besides sprinklers, some hazardous areas are protected by a two-shot carbon-dioxide system.

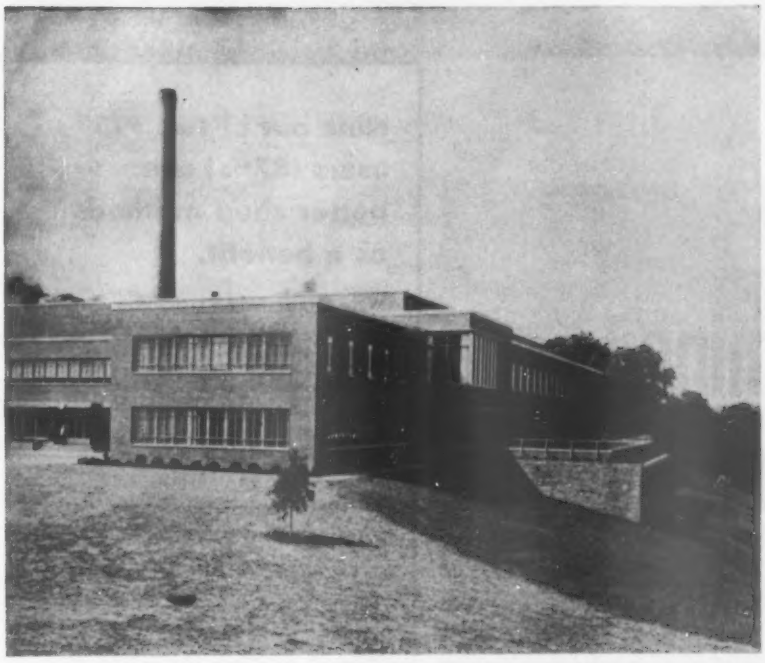
HEAT DETECTORS · In all labs and other danger spots. Visible and audible signals are flashed to a central station in the boiler house.

STANDBY POWER AND LIGHT · It's supplied by a 100-kva. diesel-powered unit. Utility does not provide loop or dual service.

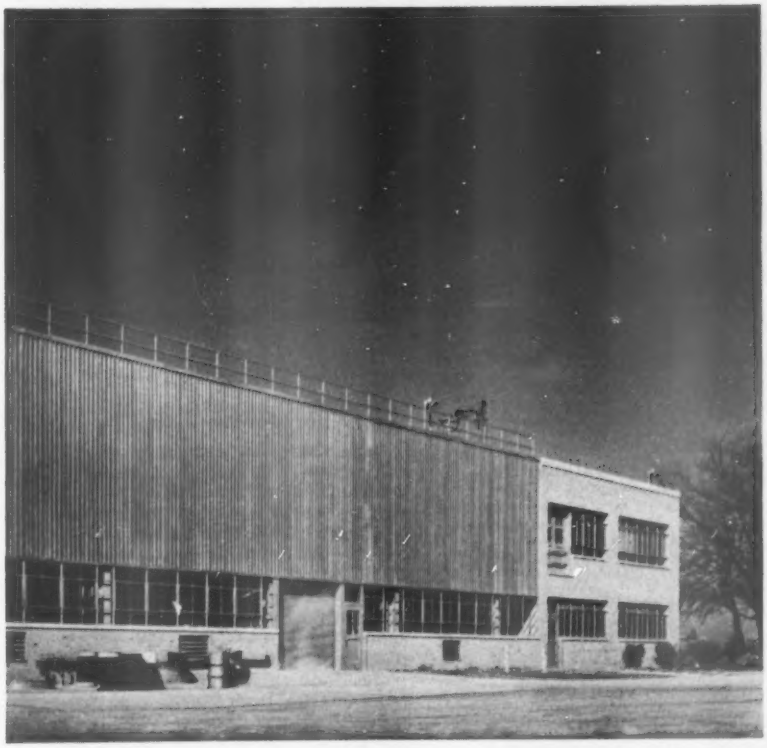
RURAL SITE of Miami Valley Laboratories is a small plateau in rolling, wooded country. Land at right



PILOT PLANT is integral part of main building not an afterthought (as is too often the case). It



slopes toward Great Miami River. You're looking at main entrance and north wing. Extension to north wing is in foreground, promenade deck at right.



houses facilities for making special-process machinery, has direct access to development labs. Railing on roof surrounds outdoor work deck.

About Miami Valley Laboratories

Located in Colerain Township, Hamilton County, Ohio. Approximately 17 miles northwest of Cincinnati.

Houses research and development labs, engineering and administrative offices, and pilot plant.

Designed by Albert Kahn Associated Architects and Engineers.

Floor space totaling 127,000 square feet is provided by two stories and basement.

Fireproof construction materials were used because of remote location. Main building has concrete frame, solid masonry exterior walls. Pilot plant and boiler room are steel-framed, with masonry walls to sill height, steel sash, and insulated aluminum siding.

Offices have plaster walls, metal acoustic ceilings, and rubber tile floors with composition bases.

Lab walls are ceramic-glazed hollow tile, made so that one series of service mains serves two labs. Furred shafts outside each lab make it easy to get at services. Floors are rubber tile, ceilings exposed concrete.

Pilot plant has concrete floor, glazed hollow-tile walls to window-sill height.

Toilet, shower, and locker rooms are designed for easy maintenance. They have glazed-tile walls, terrazzo floors, and metal-pan ceilings. Lockers are set on terrazzo bases, furred in at top. To keep floors clear, toilets are hung from walls, partitions from ceilings.

A FACTORY SURVEY

OF MANAGEMENT PRACTICE

What 132 users are really getting from

Predetermined Time Standards

Nine out of ten (87%) cite better shop methods as a benefit.

Nine out of ten (92%) say they plan to make increased use of PTS.

Almost all (97%) agree that PTS are accurate enough.

But—four out of five (80%) continue to use the stopwatch too.

PREDETERMINED TIME STANDARDS (PTS) is our term for time standards developed from basic motion study data for fundamental manual motions. Grouped into tables covering a complete set of basic manual motions, these standards provide a system for measuring manual work.

HOW GOOD ARE THEY? There's a hot debate on. Some people like 'em. Some don't. Which is mighty confusing to plant operating executives who want solid answers based on solid experience. Here they are—out of the experience of 132 companies that are using PTS.

There are presently five well-known systems available to industry:

- Basic Motion Timestudy
- Elemental Time Standards
- Motion-Time Analysis
- Methods-Time Measurement
- Work Factor

Although all five are similar in concept and objective, each differs from the others in the detailed breakdown of manual motion into basic elements. All are available through management consultants. (A few companies have their own individually developed systems.)

1 • WHAT WILL PTS

Nine out of ten PTS users (87%) cite better shop methods as a benefit.

WHAT THIS MEANS · The key point is that the answers to every one of these basic questions show a high degree of satisfaction with PTS—that is, if changes for the better are a reasonable guide.

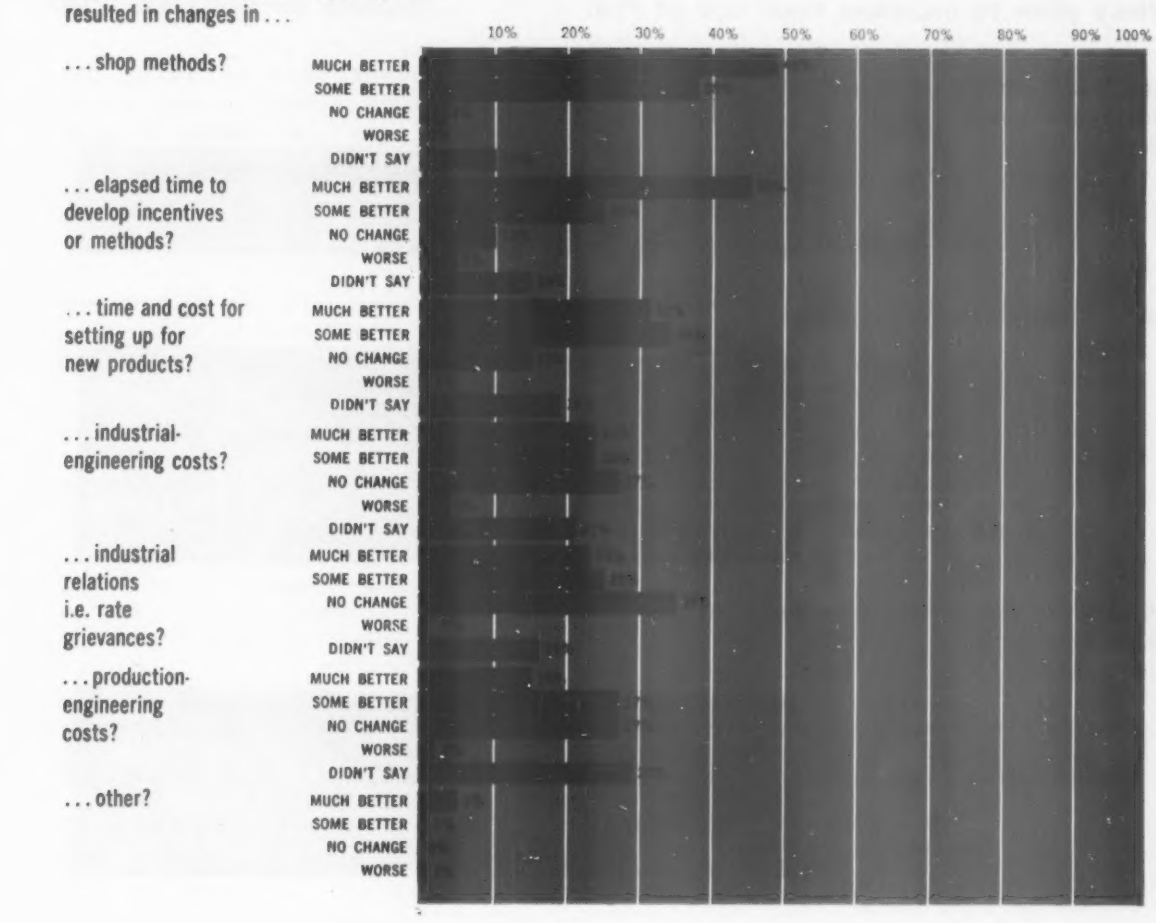
Certainly the amount of dissatisfaction is very small; no more than 5% of the companies find a "worse" situation than with traditional time study — "worse" from the standpoint of its taking more time to develop incentives or methods with PTS. And most of these companies noted that the extra time was needed because they were developing standard data, or were still getting experience with PTS.

On three points, however, less than a majority of the companies have found positive gains. The higher percentages of "no change" account for this on the subjects of both industrial and production engineering costs, and industrial relations.

About the survey . . .

Questionnaires were sent to 263 companies; 163 replies were received. Fifteen respondents have studied a PTS system, or had men trained in one, but are not using it. Seven are considering adopting PTS at this time, and nine have completed preparation and are planning to start using a system soon. Replies of the 132 active users are reported on this and five pages following.

FACTORY tried to send questionnaires to every user of PTS, both present and past. We requested all consultants and associations in the field to tell us the names of all



companies known to have used PTS at any time. FACTORY added the names of companies known to us to be using "private" systems.

Obviously, our list was not complete since some clients' names could not be disclosed. And some consultants could not supply names of those no longer active clients—perhaps including companies that have tried PTS and abandoned them. If you're in this latter group, we'll be glad to hear your story. Address The Editor, FACTORY, 330 West 42nd St., New York 36.

Of the 132 users, following is the composition by industry, size, and years' experience with predetermined time standards:

Summary of companies surveyed

INDUSTRY	NO. OF COMPANIES
Metalworking and metal products	32
Textile	16
Electrical equipment	15
Woodworking	11
Pulp, paper, and publishing	9
Radio and electronics	7
Home appliances	6
Food products	6
Heavy machinery	4
Chemical and petroleum	4
Ceramics	4
Automotive	3
Building materials	3
Foundry	3
Rubber	3
Aircraft	2
Leather goods	2
Medical supplies	2
TOTAL	132

NO. OF EMPL.	NO. OF COMPANIES
500 or less	41
500 to 2000	44
Over 2000	38
Didn't say	9
TOTAL	132

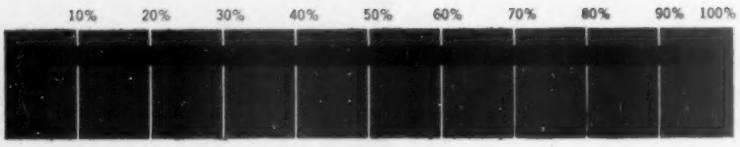
NO. OF YEARS' EXPERIENCE WITH A PTS SYSTEM	NO. OF COMPANIES
10 years or more	6
5-10 years	17
3-5 years	15
2-3 years	27
1-2 years	25
Less than 1 year	20
Didn't say	22
TOTAL	132

Turn the page

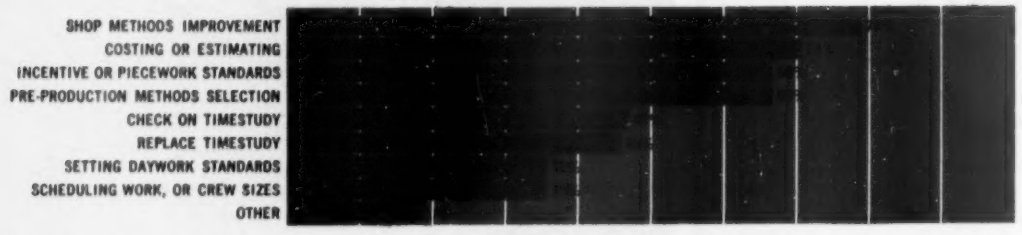
2 • WHAT'S THE FUTURE OF PTS?

Nine out of ten users (92%) say they plan to increase their use of PTS.

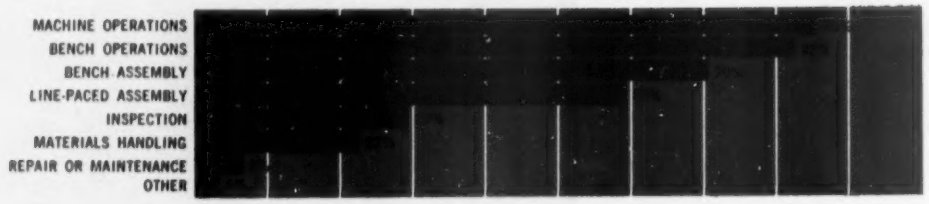
QUESTION: To what extent do you plan to use your system of PTS in the future?



QUESTION: For which functions do you use PTS?



QUESTION: For which operations do you use predetermined motion-time standards?



WHAT THIS MEANS • Survey results leave no doubt that users intend to increase their use of PTS. As to specific future applications, present applications seem to suggest the trend. The most widespread are noted in the chart above.

But a significant fact is this: **The longer a company has been using PTS, the greater the number of different uses to which the tool is being put.** Except for the mutally exclusive categories, "check on timestudy" and "replace timestudy," a number of companies report using PTS for *all* of the functions listed above. Other areas of application mentioned included machine design, plant layout, tool selection, product and package design, training new employees, training industrial engineers, and standardizing time values for all of a given company's plants.

In answer to the question, "For which functions have you had difficulty in using PTS?" only 15% reported having had any trouble at all. Applying PTS to incentive or piecework standards was "difficult" for 7%—and half of these noted voluntarily that they lacked experience with PTS. In two cases, unions had objected to incentives. Other "difficulties" included pre-production methods selection (3%), and daywork standards (2%).

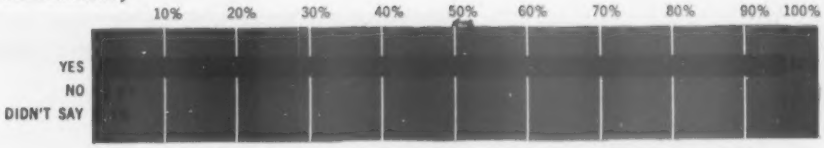
On specific operations, 11% of users had found difficulty in setting inspection standards by PTS, and 4% had trouble trying to use PTS for repair and maintenance work. Others mentioned were spray painting, buffing and grinding, hand filing, upholstering, metal spinning, soldering, and glass cutting.

Some difficulties were attributed to the people applying the system, and not to the system itself. Said one company: "Be sure the engineer knows what he is doing. PTS looks simple because of its completely logical approach, so there's a tendency to try to do too much without thorough training and experience."

3 • HOW ACCURATE ARE PTS?

Almost all users (97%) agree that PTS are accurate enough.

QUESTION: Do you feel that the values of your predetermined elemental motion-time system are sufficiently accurate for your use?



WHAT THIS MEANS • A lot of words are currently being used in an argument over the accuracy of PTS values. From the survey results, users seem to feel these words are wasted; that PTS values are accurate enough by the measure that really counts: practical shop application.

Time and again comments of respondents emphasized the consistency of time standards based on PTS — especially elimination of individual judgment in leveling. But they also stressed the need for care and accuracy by trained engineers in applying PTS. As one man put it, "It's the accuracy of the engineer which might be in question, if anything."

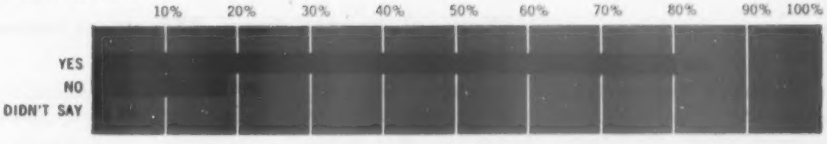
Several companies said PTS values were accurate enough, but "require adjustment as to level." That's simply a matter of multiplying PTS values by a uniform factor to get an expected performance and earnings level comparable with the plant's traditional level under time study. One company discounted the accuracy of PTS on this point alone.

A question *not* answered by the survey is the matter of the *absolute* accuracy of PTS. Two comments, however, seem to get at the nub of the problem of a standard for accuracy: "PTS values exceed *requirements* for accuracy," and, "They have proved as accurate as can be expected *when human judgment is involved.*"

4 • IS THE STOPWATCH OUT?

Four out of five users continue to use the stopwatch.

QUESTION: Do you supplement PTS studies with stopwatch studies?



WHAT THIS MEANS • Since PTS values are for manual motions only, it's a mild surprise to find even 18% no longer using the stopwatch at all. For the balance of the companies, it's the comments on *how* they are using the stopwatch that are revealing.

Better than half of the companies (57% of the 80%) are using stopwatches to check PTS values. Three primary reasons for this check are: To satisfy a union; to develop confidence among employees; and to develop confidence in PTS on the part of timestudy-trained engineers. A fourth reason showed up a few times: "Not enough engineers trained in PTS yet."

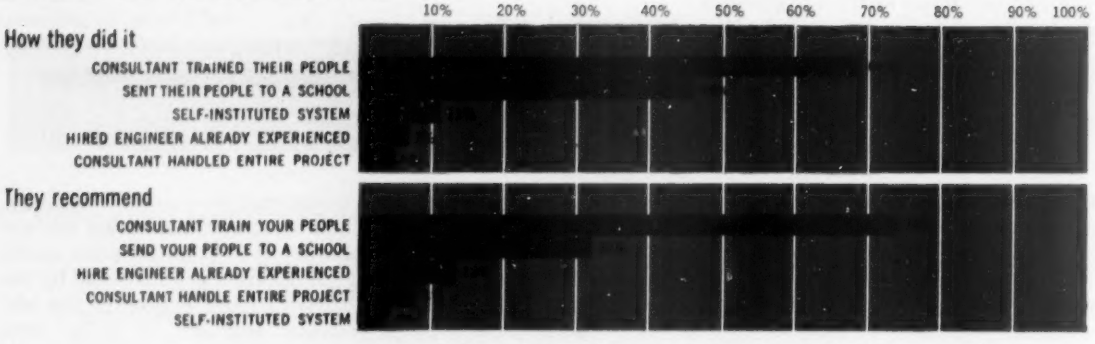
In addition, three-fourths of the companies (76% of the 80%) use stopwatches to set standards on operations or parts of operations. Most often mentioned here was the need for timing machine or process cycles—a job that remains the exclusive province of either the stopwatch or mechanical performance tables. The other spots for using the stopwatch were long-cycle jobs and short-run or one-of-a-kind jobs. A frequent comment in this connection was "PTS would be better but takes too long."

Turn the page

5 • WHAT IT TAKES TO INSTALL PTS

You'd better call in a consultant.

QUESTION: Which method did you use to bring predetermined time standards into your plant?



Percentages total more than 100% because several companies checked two or three methods

WHAT THIS MEANS • The important point for you here is the extent of the feeling that competence must be brought to a PTS installation at the outset.

A substantial number of the companies that depended on building competence within their own organizations do *not* advise other companies to follow this same practice. Note the "switches" in replies between past practice and recommendations for the future. Companies are definitely in favor of hiring consultants—or trained engineers.

The "school" indicated in the replies is really just a matter of out-of-plant training for present employees.

But, regardless of the method of bringing PTS into the plant, it's going to take trained people on your own payroll to apply the system and keep it going. Here's what FACTORY found out in reply to the question, "How many people in your plant are actively applying the system?"

Plants with less than 500 employees have an average of three applicators. Naturally, there was a wide variation from plant to plant (actually the range was from 1 to 12), the number in each case depending on the extent of the PTS program.

Plants with 500 to 2000 employees averaged 5 PTS men, with the range from 1 to 22. The plants with upwards of 2000 employees had an average of 16 PTS applicators. The range here was from 1 to 100; but the plants of this size with less than 5 PTS men were just getting started, and presumably getting present help from a consultant.

Typical quotes from PTS users

"Methods become the prime function of your timestudy department . . . will result in definite savings, easier-performed operations, and closer tie-in with quality control."—*William C. Thompson, Manager, Methods & Standards, Argus Cameras, Inc., Ann Arbor, Mich.*

"True results are obtained because the engineer is forced to observe and analyze—and very often question—certain moves and motions which may seem superfluous or unnecessary, thereby improving the method. With stopwatch, engineer tends to accept complete work cycle without question—timing whole thing 'in a package' with surplus moves and inefficiencies."—*Neil November, Assistant Manager, Friedman-Marks Clothing Company, Richmond.*

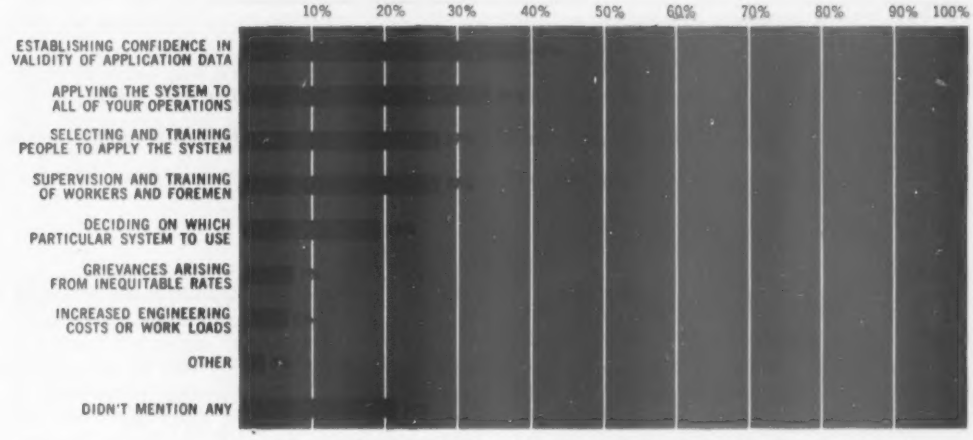
"The most beneficial factor of PTS is the elimination of guesswork, such as leveling. PTS induces consistency between all timestudy men."—*A. C. Scott, General Manager, Soreng Products Corporation, Spring Valley, Ill.*

"Too many companies are dabbling with PTS without giving proper instruction in its use to qualified personnel. This will have a tendency to give PTS a black eye if it is misapplied."—*California Manufacturer.*

"The training of selected persons in the technique of predetermined motion standards is an investment that will return to management an income far in excess of any other capital investment."—*J. A. B. Briggs, Industrial Engineering Department, Shipping Containers, Ltd., Montreal.*

You'll have to face problems like these.

QUESTION: Which (if any) management problems has your company experienced in connection with predetermined time standards?



Percentages total more than 100% because several companies checked more than one problem

WHAT THIS MEANS · Actually, the story here is the success with which these problems have been overcome. In each case where a company reported a problem, we asked, "Has it been solved satisfactorily?"

While 39% of the users had a problem in establishing confidence, only 3% report it not yet solved satisfactorily. Still unsolved by 8% of users is the problem of applying PTS to all operations—but PTS isn't intended or claimed to apply universally.

Selecting and training applicators is unsolved by 7%. And the comments indicate that "keeping" should be added to selecting and training. The shortage of PTS engineers is so severe that pirating—sometimes at fancy prices—is fairly widespread. A complicating factor is brought out in the further comments that "PTS requires a higher type of individual, mentally, with better background," and, "Not every good timestudy engineer makes a good motion analyst."

One respondent highlights a danger sign for others embarking on PTS programs: "Not enough engineers were trained, and they need to be relieved of other routine duties."

"PTS are best applied to standard, definite-path, short-cycle, manually controlled repetitive operations."

"A PTS system teaches you to look at a factory operation in a way that you never looked at one before. You observe every little detail, and become very methods conscious. It makes it possible to examine (and compare) various methods quickly at your desk—instead of the old way of timing the operator performing the operation by the various methods." — *Gordon S. Phillips, Manager, Standards Dept., Deilcraft Division, Dominion Electrohome Industries Ltd., Kitchener, Ont.*

"We wouldn't try to operate without PTS." — *G. G. Sullivan, Industrial Engineer, Metlox Manufacturing Company, Manhattan Beach, Calif.*

"Consistency of time standards much more apparent with possibility of human error on part of observer reduced considerably." — *A. C. Bathurst, Assistant to Plant Superintendent, W. A. Sheaffer Pen Company of Canada, Ltd., Malton, Ont.*

"Management should know that there are limitations in any PTS, and that proper use of stop watch will save time on various elements of different jobs, especially on complicated analyses."— *R. H. Wheeler, Supervisor of Time Study, Bay State Abrasive Products Company, Westboro, Mass.*

"One correct analysis of an operation is all that is necessary [with PTS], whereas with timestudy one analysis is often not enough."—*F. W. Dull, Production Planning Manager, International Steel Company, Evansville, Ind.*

To Tickle Your Imagination...

Advance notice of unusual and exciting developments.
Our guess: There's at least one you'll want to start thinking about today
—perhaps doing something about tomorrow.

New Insulating Additive

Standard Oil Company (Ohio) had one purpose in mind when it developed plastic "microballoons"—a cheap way to minimize evaporation of crude petroleum. But a host of other applications may result from the lightweight and excellent insulating properties of these minute gas-filled cells. All you need is the right kind of binder to mix with microballoons and you have a lightweight cork-like material with excellent acoustical as well as temperature-insulating properties.

All kinds of possibilities exist for lightweight insulating materials in the fields of plastics, cements, and asphalt. A "microballooned" cement block weighs about half as much as one of sand cement. Although it is not certain price will be competitive with other filler materials, other industrial applications may some day surpass the petroleum industry applications.

The process for producing microballoons is a variation of spray drying, and the 0.0001- to 0.003-diam. particles could be made from many different materials. Sohio researchers discovered the industrial product possibilities, but Union Carbide's Bakelite Division is considering development of applications outside the oil industry.

The Day of the Transistor

Recent developments in materials and design for transistors may speed the day when these tiny "electron controllers" revolutionize the field of industrial electronics. General Electric has found a way to obtain many more layers of crystals from germanium ingots. Du Pont's pure silicon, Battelle's aluminum-and-antimony alloy, and Brown Allen's semi-conductor materials may produce transistors with more stable operating characteristics, especially at higher temperatures. Design trend is toward hermetic sealing to keep out moisture, another step in the fight for more stable operating characteristics.

All this brings speculation that the day may be closer when transistors will help make the automatic factory a practical reality. Because they are rugged and use simpler circuits than electron tubes, transistors may provide the answer to many questions posed in this month's feature story on electronics (see p. 118).

Furthermore, they have longer life than tubes, are much smaller and require less power. Simple plug-in components using transistors and printed circuits will offer new impetus to widespread application of advanced industrial electronics. And maintenance shouldn't be such a problem either.

We've heard a lot about new devices that will become practical, thanks to transistors. In the industrial field, you may some day find midget computer units controlling machine tools. You'll be able to keep in touch with others around your plant by using wrist radios or walkie-talkie-lookies, never made practical by conventional electron-tube circuits.

Byproducts from Waste

We keep hearing more about new uses for byproducts that were formerly considered waste. Northern Research Laboratory of the Bureau of Agriculture and Industrial Chemistry, U. S. Department of Agriculture, has helped food processing industries discover practical uses for fruit pits and nut shells. Here's what they're suggesting:

About a billion pounds annually of this kind of scrap can be converted into usable form. Some shells are highly absorbent—can be spread over floors to improve safety in damp or oily work areas. Others can be used in bricks or ceramics to control the degree of porosity. Combining coarse particles from hard shells with tire treads makes auto tires anti-skid. Finely ground shells provide filler materials for plastic molding compounds.

Perhaps you've heard what the iron and steel industry has been doing with its scrap? Blast furnace slag, formerly a waste byproduct, is being processed as a base for lightweight concrete building blocks. Slag blocks absorb sound—have a high fire resistance also.

Perhaps you've uncovered a novel use for your scrap, waste, or left-over materials? We'd like to hear about it so we can pass the word along to other industry guys—and they'll thank you for the tip, too.

Better Electronic Memories

Research at Bell Laboratories shows promising results from tiny barium titanate crystals that remember information indefinitely. Big advantage of the new crystals: They can store more information in a smaller volume of equipment, and all stored information is accessible in one-millionth of a second.

By means of a series of electric pulses (plus or minus in direction) the crystals can be told to remember "yes" or "no" answers. A system of numbers or letters can be coded in yeses and noes to remember any kind of information. And a flat crystal one-half inch square can remember the answers to 250 yes-or-no questions!

RCA recently announced development of a miniature magnetic-core memory system. It consists of a grid of fine wire with a tiny ring-shaped electromagnet at each of its 10,000 intersections. The entire system fits into a 10-in. square frame. RCA expects it to provide more economical means for storage of coded information.

While these new memory systems are still in their experimental stages, other types of electronic memory systems are tried and proved. Magnetic drums revolving at high speeds, tapes similar to those on sound recorders, and cathode ray tubes have been used successfully in electronic computers.

Electronic memory systems will be used in many ways in industrial plants—to store inventory data, for example. A coming article (scheduled for October or November) contains a down-to-earth description of how this is working for one company.

Corrosion Cure Coming?

Some day maintenance crews may go around your plant spraying a permanent glass-like coating over tanks, beams, shelves —or what have you that needs protection against corrosion?

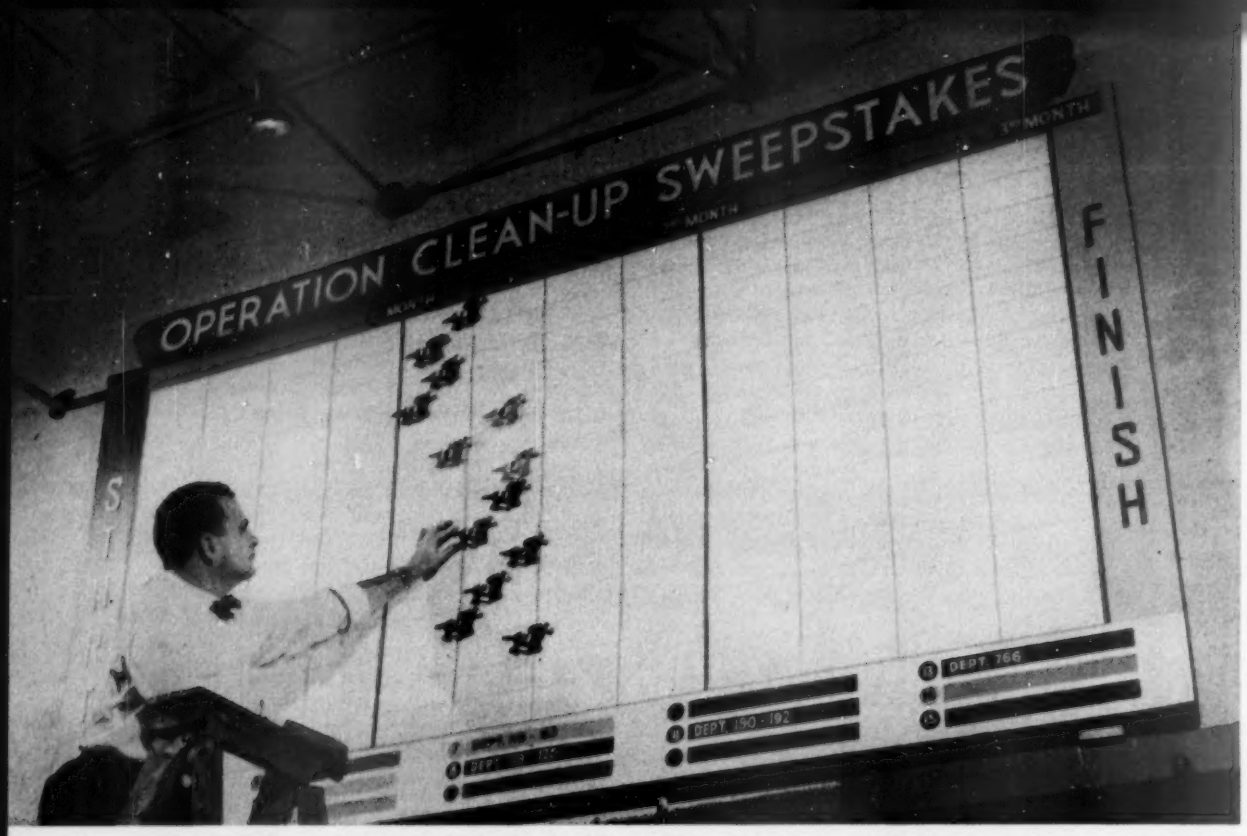
That's a not-impossible application of the spray-gun device Seaporcel Metals, New York, has been developing to porcelainize equipment that can't be handled conveniently by standard furnace methods.

Flame from the gun's main nozzle first heats the metal. Then the porcelain mixture is blown through tiny holes around the nozzle. The flame melts the material as it is sprayed from the nozzle of the gun, thus fusing the molten porcelain to the metal you're protecting.

Result is a glass-like, durable finish that is easy to clean and resists smoke, moisture, and chemical corrosion.

Equipment needed would include only oxy-acetylene tanks, a small tank for the porcelain powder materials, and a normal-size air compressor. Five hoses connect these tanks to the 7-lb. hand gun.

While the method may be slow and costly now, prospects for improvement in the future look good. Seaporcel hopes that some day it will be able to market the idea. If it becomes practical, the aspirin manufacturers would lose some steady customers. Imagine what a potent weapon the "porcelain gun" would be against corrosion!



HOSS RACE, WITH A NAG FOR EACH DEPARTMENT, KEEPS ELASTIC STOP NUT EMPLOYEES "SOLD" ON CLEANLINESS.

Year-long contest

Gets Workers Into Clean-Up Habit

TROUBLE WITH MANY A PLANT CONTEST is that it comes to an end—too soon! The day after it's over, the backsliding begins.

Not so, though, at Elastic Stop Nut Corporation of America, Union, N. J., where "Operation Clean-up" is just now drawing to a close. This contest was designed to arouse and sustain worker interest in plant cleanliness. It was planned to last a whole year—on the theory that by the end of that time interest in a high level of plant cleanliness would have become an employee habit. And that, as you will see when you come to the "pay-off" at the end of this article, is precisely what has happened.

There was the danger, of course, that a year-long contest would get to be an old story. Operation Clean-up was therefore broken down into four quarterly contests (called "heats"—you'll soon see why). If a department loses out in one heat, it still has other chances to win.

ORIGIN • The idea came when management decided to clean up and paint up, resurface shop aisles, and do some other much-needed renovating. At the time the level of plant cleanliness was about average. Nothing to be ashamed of, but not nearly so good as it should be. What with the company putting money and effort into improving the plant appearance, it seemed an excellent time to get employees to increase their efforts toward cleanliness.

CONTEST OBJECTIVES • Higher productivity and fewer rejects—due to more pleasant and convenient working conditions. A safer plant—due to reduction of such hazards as cutting-oil slicks and spilled nuts. Also, ESNA looked for reduction of mixed-up stock—a real problem for a firm that manufactures small units in million-piece quantities.

GOOD TIMING • Running a contest meant asking the workers to make a special effort. To prove that management, too, was making an effort, Operation Clean-up and plant painting were timed to overlap. During the first few weeks of the contest, maintenance crews were busy on the last stage of the renovation program—painting machinery and equipment in bright colors.

INSPECTION SHEET — SHOP CONDITIONS SUPERVISOR _____ JUDGE _____ DATE _____

Over all condition of section	☐☐☐☐ "Top notch"	☐☐☐ Tidy	☐☐☐ Clean	☐☐☐☐☐ Passable	☐☐☐☐☐ Unsatisfactory
Condition of floor	☐☐☐☐ "Can eat off it"	☐☐☐ Shipshape	☐☐☐ O.K.	☐☐☐☐☐ Spotted with oil, papers, rags	☐☐☐☐☐ Downright dirty
Garbage, scrap cans	☐☐☐☐ Mixed, overflowing, area dirty	☐☐☐ Battered cans	☐☐☐ Tolerable	☐☐☐☐☐ Good condition	☐☐☐☐☐ In place and spotless
Nuts on floor	☐☐☐☐ Not a one	☐☐☐ Scattered few	☐☐☐ Quite a few	☐☐☐☐☐ Too many for this section	☐☐☐☐☐ Dangerous
Machine accessories	☐☐☐☐ Secure and orderly	☐☐☐ In place	☐☐☐ Need attention	☐☐☐☐☐ Dirty and dangling	☐☐☐☐☐ Unattached and all over the area
Machine tools and gages	☐☐☐☐ Nobody knows where they are	☐☐☐ Dirty and out of order	☐☐☐ Slightly scattered	☐☐☐☐☐ In order	☐☐☐☐☐ Where they belong and in top condition
Wiping cloths, gloves, rags	☐☐☐☐ Clean and tidy	☐☐☐ Orderly	☐☐☐ Slightly tattered	☐☐☐☐☐ Should be replaced	☐☐☐☐☐ Draped on machines, benches, on floor
Machine condition	☐☐☐☐ Spotless	☐☐☐ Trim	☐☐☐ Clean	☐☐☐☐☐ Should be cleared	☐☐☐☐☐ Filthy
Bin stacking, paper in bins	☐☐☐☐ Askew and full of paper, rags	☐☐☐ Below par for section	☐☐☐ Orderly	☐☐☐☐☐ Good lineup, clean	☐☐☐☐☐ Apple pie order
Raw material or parts improperly stored	☐☐☐☐ Everything in order and clean	☐☐☐ Good shape	☐☐☐ Below par for section	☐☐☐☐☐ Mediocre	☐☐☐☐☐ Unsatisfactory and hazardous

HOSS-RACE STANDINGS ARE POSTED MONTHLY. EACH DEPARTMENT IS CHECKED AND SCORED FOR 10 SHOP CONDITIONS.

GOOD ORGANIZATION · The organization and administration committee for Operation Clean-up includes ESNA's chief production engineer as chairman, maintenance department head, chief foreman, inspection department foreman, and personnel manager. Since plenty of good publicity is an important factor in running a successful contest, the manager and assistant manager of the advertising and sales promotion department were named to the committee and have been very active.

GOOD PROMOTION · Operation Clean-up has a hoss race theme. Each department constitutes an entry, with its foreman as jockey. Day and night shifts in each department are combined as a single entry.

ANNOUNCEMENT · First news of the contest was a teaser announcement mailed to all employees at their homes. Three days later, workers found a large poster at the plant entrance listing entries and jockeys. During that day, all employees received contest details from their foremen.

START · On September 15, the start of the first heat, a large illuminated board that looks like a race track was hung over the door by which all employees enter and leave the plant. The track is laid out as a 3-month race, with movable horses.

INSPECTIONS · During the next week the first inspection was made. A week later, inspection results were posted on each department's bulletin board, and the horses were advanced on the race track board. During that week a new cartoon-type poster was put up to illustrate some of the faults that caused lost points.

Next day the second inspection was made. Following this, the first monthly departmental ratings were posted on all bulletin boards, including a breakdown of scoring of conditions so employees could see exactly where their department had won and lost points.

TIMETABLE · The contest proceeded on a similar schedule, with inspections held at undisclosed and varying times every second week. Since interest in posters dies rapidly, new posters were put up each week, with a new angle for each one to make it stand out as other than more of the same old thing. Inspection results were posted the 1st and 15th of each month, in each department, showing *conditions* (not item-by-item scores). And markers on the main race board were moved, to keep competitive interest up.

SCORING · The original scoring sheet asked inspectors to give numerical ratings on each of several items such as "nuts on floors," "location and condition of tools and gages," and "condition of scrap cans." This was soon found to be unsatis-

factory, since it seems to require considerable experience to measure relative cleanliness in terms of specific number grades. The average man thinks in terms of "bad," "fair," and "good," and finds it difficult to translate these terms into numbers.

Therefore a new scoring sheet was made up. Instead of numbers, it provides for scoring by offering choices of a number of boxes to check. Each group of boxes is labeled with an easily visualized description of the degree of excellence in the factor being scored. For example, under the classification "nuts on floor," the inspectors have a choice of checking "not a one," "scattered few," "quite a few," "too many for this section," or "dangerous."

Several boxes for each descriptive term serve to spread the scoring, so the inspector can indicate whether the department is high or low within the range of the term. (Range is 0 to 100.)

Thus inspectors didn't have to worry about numerical scores at all. They turned in their sheets with checks in the appropriate boxes, and the committee translated these into numbers by using a transparent overlay sheet. This has numbers printed on it in positions that correspond to the boxes on the scoring sheet. When the sheets are aligned, the numercial equivalents of the inspectors' scores can be read.

STANDINGS · Experience dictated a change in the posting of monthly standings. At first they showed only the relative standings of the departments. Now the actual point score ratings are posted. This lets each department see exactly how far above or below other departments it is, and promotes a hotter spirit of competition.

HANDICAP FACTOR · Among the departments entered in the contest, two are non-productive—shipping and packaging, and inspection. These wound up in first and second place at the end of the first heat. It was evident that their clean-up work was much easier than that of production departments and that they could continue to monopolize the contest.

Therefore, the committee developed a handicap factor, automatically added to the inspection score of each production department, to put all departments on an equal basis. The result was that the second heat in the contest was won by a machine shop entry — the automatic tapping and countersinking department.

ROTATING INSPECTION COMMITTEE · Another change was indicated by experience in the early days of the contest. It had been planned to use a different set of inspectors for each heat, replacing the 3-man panel with a new one every three months. But the first panel took longer to get operating smoothly than was anticipated, so it was decided to retain some experienced inspectors to help get the next panel functioning sooner.

The set-up was changed to a panel of four judges, including two men from the first group as permanent members for the entire contest, and two members to serve for one month (two inspections). Permanent members include a representative of management and a union delegate. The temporary members are department foremen.

Before Operation Clean-up ends, every foreman will have had a chance to participate on the judging panel, a help in keeping the communication line between supervision and management well established.

PRIZES · Competitive spirit is also promoted by hanging a "champion" sign over the department that won the previous heat, and by awarding prizes to winners of each heat. Prizes originally included men's and women's wallets, cigarette lighters with the company emblem, and "Yankee" screwdrivers. The screwdrivers have proved to be by far the most popular item, so other tools are being added to the prize list. Also, second and third prizes are now being offered.

PAY-OFF · Results to date have greatly exceeded ESNA's fondest expectations:

- **Employee interest was quickly aroused**—and sustained by frequent new posters and additional mailings to employees' homes. A good indication of interest has been the large number of voluntary suggestions to foremen about conditions that the men feel detract from their efforts to clean up. Suggestions include requests for more trash containers, assignment of additional clean-up men, rebuilding storage racks, and similar ideas.
- **Everybody keeps trying.** Departments that find themselves low in posted standing make extra efforts to improve their position.
- **The improvement in appearance has been remarkable.** It is evident to people who see the shop every day, and particularly noticeable to visitors.

One unexpected and gratifying result came when the fire insurance company's representative toured the plant in the fifth month of the contest. He was so impressed that he sent a recommendation to his home office that ESNA's rating be upped.

- **Work quality has improved,** and there is much less mixed-up stock.

WHAT DOES IT COST? Not much, considering the benefits. Monthly expenses are minor, covering posters, printing, and prizes. Initially there were some higher but non-recurring costs, such as expenditures for bulletin boards and permanent trophies. No attempt has been made to compute the cost of man-hours spent in cleaning up and in administration. But management is satisfied that all cost is being returned many times over.

MORE CONTESTS COMING · Sucess of Operation Clean-up has encouraged ESNA to plan other contests. Next will probably be a safety contest; then, a quality-control contest.

BRITONS CAN HAVE PROSPERITY —If They Want It

What is required to get Britain, our key ally in the grand alliance of the free world, firmly back on her economic feet? The purpose of this message is to throw light on this crucial problem, which afflicts our other European allies also.

At the moment, Britain is enjoying a respite from the economic crises (of 1947, 1949 and 1951-52) which have plagued her postwar course. This respite may well continue for some time. But almost no one whose judgment is trustworthy believes that Britain has acquired sufficient economic strength to safeguard her against further economic crises in the years immediately ahead.

Two British Views

New and clear light on what should be done to that end has recently been shed by two noteworthy British publications. One is a book, "We Too Can Prosper," by Graham Hutton, distinguished British economic writer and administrator. The other is an article, "The Riddle of Prosperity," published by THE (London) ECONOMIST, Europe's most eminent economic journal.

Combined, these two publications present in sharp relief the basic problem that must be handled successfully if Britain is to be safely solvent. As is implied by its title, ***the Hutton book demonstrates that Britain can be made prosperous by readily feasible procedures, patterned on what has been done in the United States, to increase its industrial efficiency. But, says THE ECONOMIST, with Mr. Hutton's book in mind, this is not the most basic problem, which is, "How shall we make the British people determined to be prosperous?"*** This is a problem of incentive or motivation.

Compared with that of the United States, average industrial efficiency in Britain, as in most of Western Europe, is low. In his book Mr. Hutton remarks that "fifty years ago an American industrial worker turned out roughly the same amount in a day as his opposite number in Britain, Germany or France. . . . Today, he turns out from two to five times as much."

In large part it is this lag in output per hour or "productivity," as the technicians call it, which makes Britain and other key countries in Western Europe a continuing prey to economic crises. Moreover, the great disparity in productivity between the U.S.A. and most

of Western Europe is a major barrier to knitting the free world into a smoothly working economic whole. As one observer put it, "when the American economy catches a cold, the European economy gets pneumonia." This is largely because Europe is so much weaker in productive strength.

No Shortage of Knowledge

Yet the knowledge which would enable the countries of Western Europe, and particularly Britain, to increase their industrial productivity has been mobilized and is readily available to them. It is with this process for Britain that Mr. Hutton's book is concerned. In the book he summarizes the findings and conclusions, virtually all of them unanimous, of 66 teams, composed of British industrial managers, technicians, shop workers and labor leaders. Over a period of three years these teams completed a comprehensive series of inspection and study trips in the United States under the sponsorship of the Anglo-American Council on Productivity. The product of that effort, he remarks, is "a set of documents the like of which, on such a scale and of such practical value, has never been seen in the history of international and cultural borrowing."

Psychology the Key

From study of these documents, Mr. Hutton concludes that better capital equipment is the key technical ingredient of higher industrial productivity in Britain, and constitutes "the most urgent . . . need of British industry." But he finds that ***even without new capital equipment a "15% rise in productivity can still be achieved by reorganization of work," and that such an increase would "solve Britain's chief social and economic problems."***

Then why is not such an increase in productivity, demonstrated by the Anglo-American productivity teams to be so clearly within technical grasp, promptly forthcoming? Mr. Hutton, quoting one of the team reports, remarks that, ***"'the greatest obstacles to increased productivity are psychological rather than technical.'*** We have to deal first and foremost with men, not machines." And THE ECONOMIST, pursuing the line of inquiry suggested, reaches the conclusion that, by and large, the people of Britain do not want to prosper by being more efficient. THE ECONOMIST says:

> "The real secret of American productivity is that American society is imbued through and through with the desirability, the rightness, the morality of production. . . . But in Britain, if any moral feeling at all survives about economic matters, it is usually a vague suspicion that economic success is reprehensible and unworthy. From this difference in attitudes everything else follows."

"How," asks THE ECONOMIST, "shall we set about restoring some belief in the rightness of effort, the morality of success?" For this question it has no ready answer. Neither have we. We are confident that the British people will neither be cajoled nor coerced into trying to match our productivity. Basically the problem seems to be to demonstrate clearly to them the truth of the proposition, set down by Graham Hutton, that "there is no goal, aim or end before a Good Society which the raising of that society's material productivity cannot render easier of achievement." Doing that in an old and settled country like Britain is obviously an extremely formidable undertaking. But ***until it is done, the crucial job of getting Britain and the rest of Western Europe firmly on its economic feet will remain to torment all of us.***

McGraw-Hill Publishing Company, Inc.

• All figures are average straight-time earnings in manufacturing industries except figures in light-face type, which are for all industries. They include incentive pay, if any. But they do not include overtime or night-shift premium.

Surveys were not all made at the same time. Date of each survey is shown under the city name.

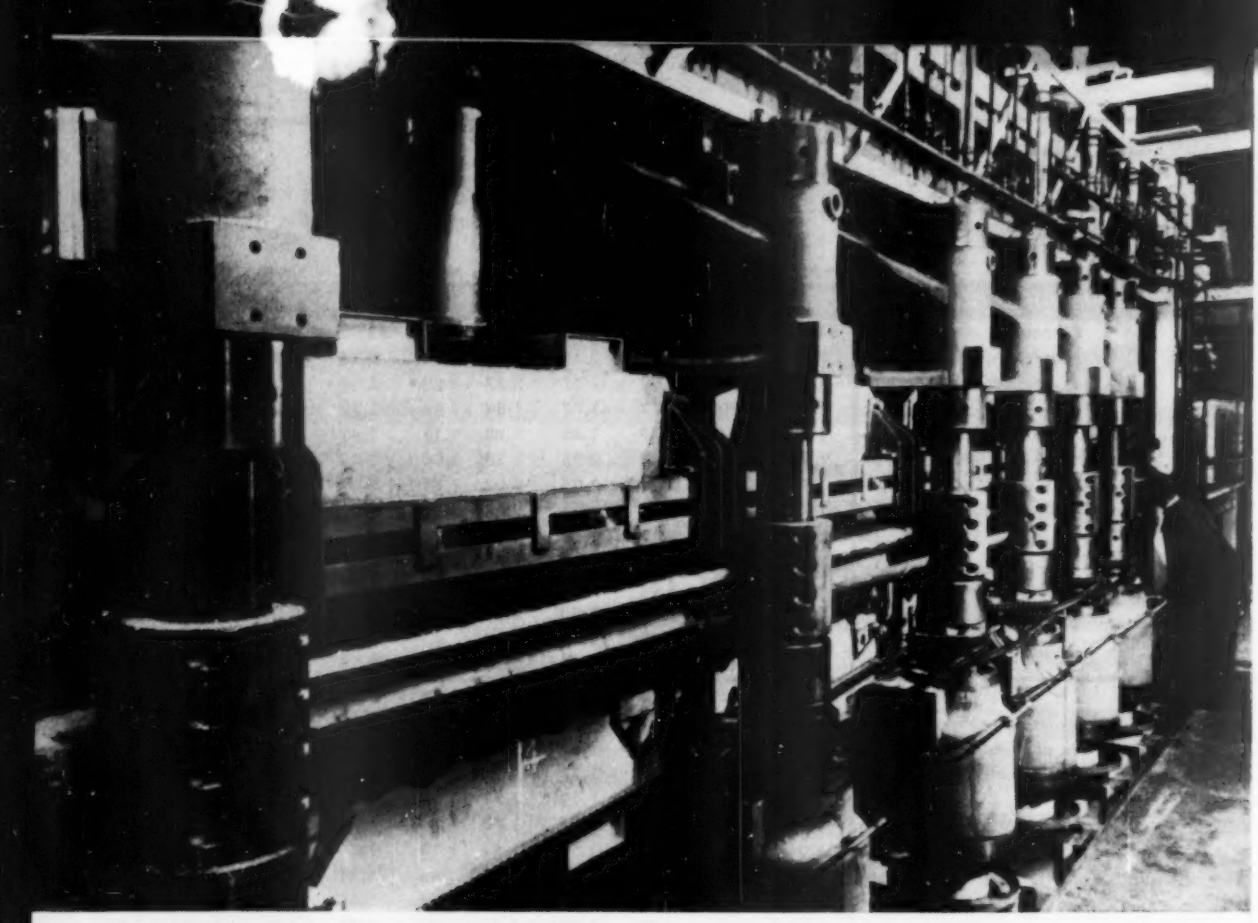
		ATLANTA MARCH 1953	BOSTON MARCH 1953	BUFFALO APRIL 1953	CHICAGO MARCH 1953	LOS ANGELES FEBRUARY 1953	MEMPHIS JANUARY 1953	MILWAUKEE APRIL 1953	NEW YORK FEBRUARY 1953	ST. LOUIS DECEMBER 1952	SAN FRANCISCO JANUARY 1953
MALE JOBS, EXCEPT WHERE OTHERWISE SHOWN		AVERAGE STRAIGHT-TIME HOURLY EARNINGS									
Maintenance and Power Plant Jobs	Carpenters, maintenance	$1.87	$1.85	$2.07	$2.08	$2.05	$1.62	$2.06	$2.01	$2.05	$2.29
	Electricians, maintenance	2.04	2.02	2.14	2.19	2.19	2.04	2.15	2.22	2.14	2.28
	Engineers, stationary	2.04	2.00	2.03	2.27	2.17	1.82	2.09	2.24	2.14	2.27
	Firemen, stationary boiler	1.38	1.70	1.77	1.77	1.88	1.15	1.77	1.78	1.79	2.06
	Helpers, trades, maintenance	1.37	1.57	1.77	1.73	1.82	1.11	1.65	1.57	1.81	1.94
	Machinists, maintenance	1.98	1.95	2.12	2.25	2.20	2.00	2.22	2.13	2.15	2.26
	Mechanics, automotive (maintenance)	1.59	1.89	2.01	2.05	2.08	1.61	2.09	2.01	2.00	2.28
	Mechanics, maintenance	1.79	1.84	2.14	2.06	2.03	1.86	2.08	2.01	1.96	2.14
	Millwrights	2.14	1.87	2.15	2.10	2.18	1.91	2.10	1.91	2.07	2.19
	Oilers	1.23	1.50	1.79	1.73	1.70	1.57	1.80	1.64	1.77	1.77
	Painters, maintenance	1.98	1.80	2.01	2.09	2.05	1.83	2.12	2.06	2.09	2.26
	Pipefitters, maintenance	2.04	1.95	2.10	2.20	2.20	2.03	2.15	2.04	2.18	2.30
	Sheetmetal workers, maintenance	2.13	1.95	2.16	2.18	2.13	—	2.20	2.06	2.15	2.31
	Tool and die makers	—	2.12	2.25	2.41	2.32	2.18	2.28	2.31	2.31	2.45
Custodial, Warehousing, and Shipping Jobs	Guards	1.73	1.55	1.72	1.65	1.73	1.48	1.56	1.52	1.59	1.75
	Janitors, porters, and cleaners	1.17	1.31	1.55	1.47	1.50	1.09	1.51	1.32	1.35	1.64
	Janitors, porters, and cleaners (women)	.90	1.17	1.38	1.35	1.42	.97	1.31	1.17	1.13	1.47
	Laborers, material handling	1.07	1.42	1.59	1.53	1.67	1.10	1.63	1.50	1.50	1.76
	Order fillers	1.26	1.54	1.64	1.59	1.72	1.20	1.68	1.46	1.42	1.78
	Packers, class A	1.33	1.56	1.68	1.64	1.73	—	1.74	1.48	1.62	1.80
	Packers, class B	1.06	1.35	1.76	1.51	1.62	1.13	1.64	1.32	1.37	1.75
	Packers, class B (women)	1.17	1.06	1.24	1.32	1.58	.96	1.21	1.25	1.14	1.57
	Shipping clerks	1.46	1.50	1.79	1.82	1.86	1.52	1.86	1.56	1.62	1.86
	Shipping and receiving clerks	1.43	1.55	1.73	1.72	1.76	1.43	1.77	1.56	1.68	2.03
	Truck drivers, light (under 1½ tons)	1.17	1.48	1.69	2.16	1.66	1.14	1.58	2.04	1.77	2.05
	Truck drivers, medium (1½ to 4 tons)	1.05	1.74	1.71	1.92	1.89	1.10	1.73	1.86	1.74	2.08
	Truckers, power (fork lift)	1.31	1.59	1.73	1.75	1.77	1.44	1.74	1.77	1.67	1.80
	Truckers, power (other than fork lift)	1.52	1.73	1.79	1.66	1.71	—	1.74	1.98	1.62	1.76
	Watchmen	.97	1.29	1.47	1.42	1.53	1.03	1.46	1.27	1.37	1.59
FEMALE JOBS, EXCEPT WHERE OTHERWISE SHOWN		AVERAGE STRAIGHT-TIME WEEKLY EARNINGS									
Office, Professional and Technical Jobs	Comptometer operators	$53.00	$50.50	$54.50	$60.00	$61.00	$56.50	$52.00	$54.00	$51.00	$60.00
	Draftsmen (men)	76.00	85.00	88.50	89.00	87.50	79.00	88.50	88.00	81.50	85.00
	Draftsmen, junior (men)	61.50	62.50	69.00	64.50	69.50	—	72.50	59.00	58.00	69.00
	Duplicating-machine operators	47.50	48.50	45.00	48.50	56.50	46.00	48.50	48.50	47.00	56.50
	Key-punch operators	47.50	47.50	54.00	55.50	63.00	48.50	51.00	52.50	51.50	59.00
	Nurses (registered)	67.50	62.50	70.50	68.00	74.00	59.50	63.50	69.00	62.50	69.00
	Office girls	40.50	42.00	42.00	45.00	49.00	35.50	44.50	40.00	42.50	50.00
	Payroll clerks	54.00	51.00	56.00	59.50	62.50	55.50	54.00	57.50	50.50	62.00
	Secretaries	63.50	63.50	68.00	70.00	70.00	59.50	68.50	67.00	66.00	74.50
	Stenographers, general	56.50	51.50	56.50	59.00	62.00	49.50	54.50	54.00	52.00	65.00
	Typists, class A	50.50	50.50	56.00	58.00	59.00	48.00	55.00	55.00	53.00	60.00
	Typists, class B	44.00	45.50	49.00	50.00	51.00	39.50	45.50	47.50	44.50	53.50

What's Indirect Labor Worth?

HERE ARE THE NEWEST FIGURES on pay for key indirect jobs, compiled by the Bureau of Labor Statistics, U. S. Department of Labor.

To see how these figures compare with earlier surveys in the same and also 10 other areas, refer to FACTORY: Dec. '51, p. 108; July '52, p. 126; Aug. '52, p. 91; Oct. '52, p. 145; May '53, p. 81.

Further details may be obtained from the nearest regional office of BLS.



IN BRITAIN Heart of British process is this hot section of the big press, where continuous strip of wood-resin mat (with or without veneer) is squeezed into proper thickness under pressure from endless chain of platens.

HOW TWO COMPANIES ARE Applying Flow Principles

BRITISH PRODUCT, called Bartrev board, is easily machined with woodworking tools. Board comes in thicknesses from 3/16 to ¾ inch, will sell for about 6¢-10¢ a foot.

BOTH COMPANIES are making hardboard. They start with similar raw materials. They end up with similar products. But they get there by two completely different continuous-flow routes.

FACTORY presents thumbnail sketches of these two new processes because the editors think . . .

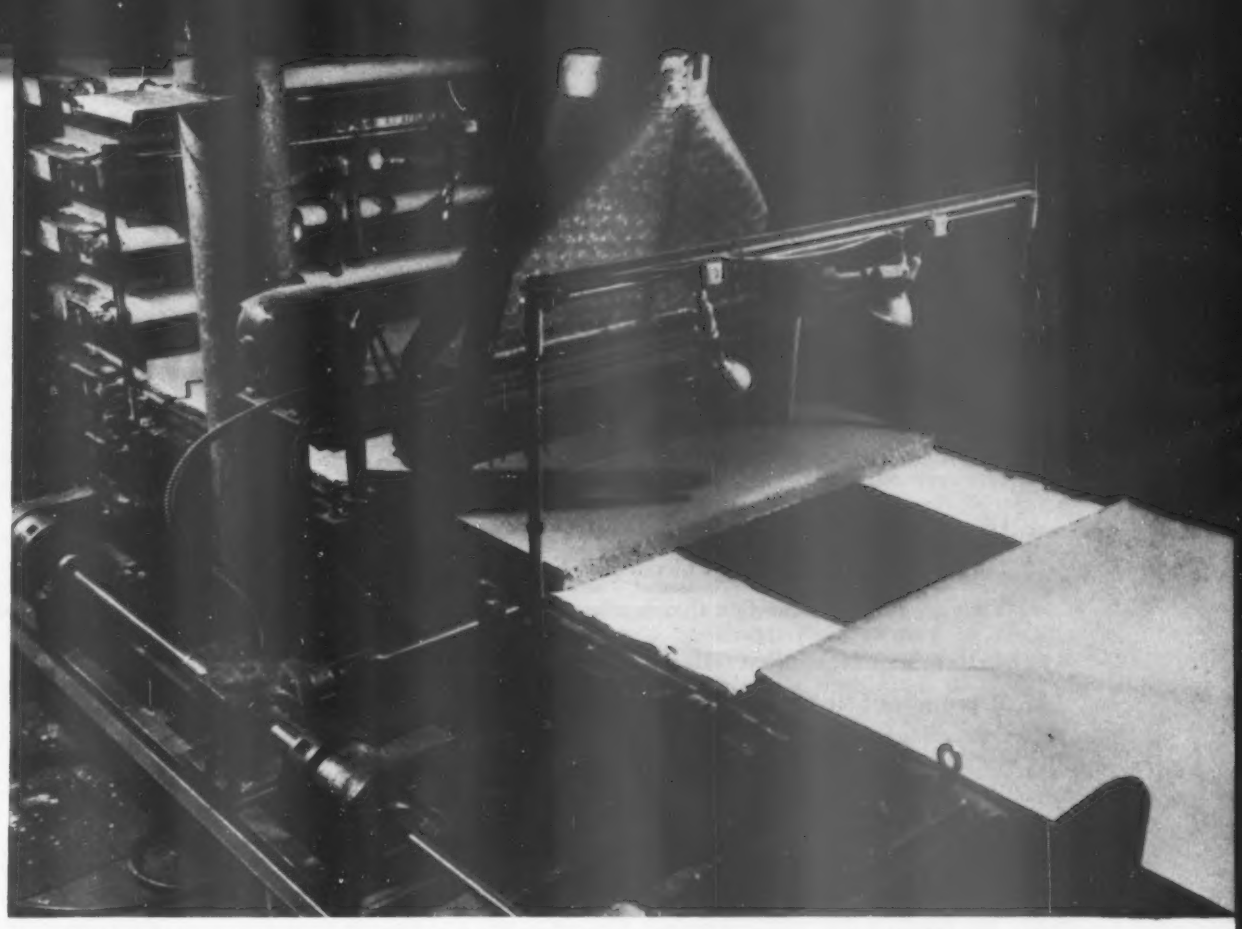
. . . you may welcome this additional proof that almost any traditionally batch-type operation can be made continuous.

. . . you ought to know about these two new products anyway.

BRITISH PROCESS • The Bartrev press, developed by Vere Engineering Co., Ltd., London, daily spits out a continuous up-to-4-ft. carpet of hardboard 5 miles or more long.

How it works. Wood waste is reduced to uniform chip size, automatically weighed, and combined with 4%-8% of inexpensive resins. The wood-resin mix is then fed onto a stainless steel belt that travels through a radio frequency preheating unit. From there the mat enters a heated zone (see photo) where the board is formed under pressure from an endless chain of platens. A traveling cut-off saw trims and cuts board to length. It can be veneered in the same press operation.

Cost. The Bartrev press sells for about $600,000. Three men run it, with a crew of 14 to operate auxiliary equipment.



IN AMERICA Heart of American process is this electronically operated curing press loader. It synchronizes press with other operations. Pushbuttons control the feeding and unloading of the wood-resin mats.

to a Batch-Type Operation

AMERICAN PROCESS • You can look down the line at Anacortes Veneer, Inc., Anacortes, Wash., and see "Armorboard" rolling off at a rate of 77,000 square feet daily. But hardly a man.

How it works. It's a new semi-dry process, developed by Plywood Research Foundation. It utilizes waste Douglas fir. The waste wood is cut up into small pieces, steamed in continuous cookers, blended with a small amount of thermosetting resins, and fed directly into a felting machine. The fibers fall upon a moving belt. As the mat emerges from the felter, it's squeezed to about 3-in. thickness by heavy rubber belts before being cut to length by a traveling saw. Then the individual sheets are pushbutton-loaded into a hardboard press built into the line. After curing, sheets are ejected and stacked.

Cost. About $750,000. Six men handle the entire operation.

BOTH PROCESSES offer three big benefits:

- Low cost. Both utilize waste timber as their basic raw material and continuous flow as their basic process principle.
- Uniformity of quality. The automatic nature of the processes insures precision quality control at every point.
- Flexibility. By varying resin content, heat, pressure, and speed, boards can be tailor-made to required properties.

AMERICAN PRODUCT, called Armorboard, is flexible, has high degree of impact resistance, sells for as little as 4½¢-9½¢ a foot. Thickness is ⅛ to ¼ inch.

Three-step mental health program

guarantees . . .

New Deal for Problem Employees

By ARTHUR O. ENGLAND • Industrial Psychologist, U. S. Air Force Material Command

Chances are that as many as two-thirds of your "problem employees" may be actually sick — not physically, but mentally and emotionally. That accounts for the fact that traditional plant methods of handling such cases often fail.

Here's an article that tells about a new approach to handling these problem cases; it promises better, faster, and more lasting results.

AFTER SOME FOURTEEN YEARS of experience as an industrial doctor, Dr. William J. Fulton of General Motors has concluded that mental health—not physical health—is the underlying cause of most accidents, complaints, and personal problems. In a 1949 study, for example, he points out that 85% of medical services are used consistently by only 30% of employees. Within this 30% group are found a high percentage of marginal workers with emotional disturbances (psychoneurotic, psychiatric).

Of what importance is all this to plant operating executives? Simply this:

Here, mainly, are your "problem employees."

These marginal workers are the ones who contribute, out of proportion to their numbers, to high accident rates, absenteeism, visits to first aid rooms, and unsatisfactory personal relationships. More important, within this relatively small group you will find the overwhelming percentage of your labor relations and personnel headaches.

Problem employees are costly, too. Their impact on a plant's accident costs alone can add up to large sums. For example:

Dr. Gordon A. Eadie, medical director of the Detroit Transmission Division of General Motors, studied 100 known problem workers. And found they had three times as many serious and semi-serious accidents as a control group of 100 normal employees. He also found that the problem group visited the medical dispensaries 3½ times more than the normal group and had 2½ times more sick absences.

Plant executives surely wouldn't tolerate the low-grade performance from machines and equipment that industrial doctors have shown they are getting from problem employees. Yet management ingenuity seems to run out of steam when it comes to tackling breakdowns of human equipment.

The Way Out— A Mental Health Program

The "way out" in dealing with problem employees isn't easy. It takes planning, effort, and money. But so does the purchase, installation, operation, and maintenance of your production facilities and equipment. There's no difference — and there aren't any short-cuts.

What's needed is a well-conceived, well-organized mental health program for your plant.

Such a program is based on the simple, logical principle that the mental and emotional problems of workers need consideration as much as the physical problems—or more.

An all-inclusive mental health program has three main aims:

1. **Screening**—to prevent problems by fitting applicants to jobs to which they will be well adjusted emotionally as well as physically.
2. **Counseling**—to straighten out problem cases by spotting sources of trouble and working out solutions with those involved.
3. **Training**—to reduce the likelihood of problem cases by giving management and employees better insight into the causes of mental and emotional upsets and what they can do to help prevent them.

These three aims require skilled professional guidance—full-time (for large plants) or part-time (for small plants). Probably the best qualified person to provide this guidance is a trained industrial psychologist. Equally desirable, of course, are psychiatrists (medical doctors with special training in abnormal psychology). But psychiatrists are in such short supply that few plants can afford their services except for specific treatment of severe cases of mental disturbances.

STEP 1 · Screening—to fit applicants to the right jobs

The advantages of pre-employment physical examinations are by now well known to most managements. Applicants are thereby assigned to work that is suited to their capacities. Resulting reductions in accidents and injuries have produced spectacular benefits in improved job performance and reduced workmen's compensation insurance rates. It is for similar reasons that pre-employment examinations relating to an applicant's mental health are of vital importance. Mental or emotional disturbances can be as disabling as physical disorders.

The probability that an applicant will adjust mentally and emotionally to a given job can be determined at the time of the physical examination. The examining doctor can do three things readily:

1. **Study the medical and personal history** for evidence of past mental difficulties.

2. **Look for evidence of emotional upset** during the actual physical examination itself.

3. **Refer all dubious cases** to the psychologist for further screening.

There is no need to outline in detail the techniques used by the psychologist. Sometimes a thorough series of psychological tests may be needed. In other cases, personal interviews will verify or refute the suggestive findings of the physical examination. A trained specialist will be competent to handle this evaluation according to his own techniques and the demands placed on him by management.

No trouble arises normally in following recommendations for outright acceptance or rejection of an applicant, based on findings by doctor and psychologist. But whether or not to accept an applicant "with limitations" is often a real problem. Aside from outright physical hazard, as in the case of plant protection employees who carry guns, there is always the danger of imposing chronic troublemakers on departmental supervisors or foremen.

Because of the risks involved, applicants hired with limitations on the kinds of work they should be assigned to should always be employed on a trial basis—preferably 60 or 90 days. In this time these applicants should be carefully followed up at 2- to 4-week intervals. Two kinds of follow-up are desirable:

1. **Reports by the immediate supervisor** on how well the new worker is doing his job, fitting into the organization, and getting along with others.

2. **Personal interview with the new worker** by the psychologist, to determine how well work adjustments are being made.

When job difficulties crop up, the case should immediately be re-evaluated. It is not fair to the company or to the new employee to let the trial period run out if early signs point to trouble.

STEP 2 · Counseling—to spot and clean up trouble sources

Individual counseling is designed to aid employees already on the payroll who have adjustment problems that prevent good work performance. Clues to poor adjustment take the form of excessive absenteeism or lateness, poor observance of safety rules, chronic complaining, chronic worry, and personal conflicts between the worker and his foreman or his fellow workers.

The idea behind counseling is that small problems, if not attended to, can grow in serious emotional disturbances. The small problem can be simply handled if caught in time. If not caught in time, it may be a long and costly job to handle the resultant big problem. The employee may even require long-term psychiatric treatment or hospitalization. Thus, catching problems in their infancy is the important "preventive maintenance" phase of a mental health program.

Here is an actual case in which counseling played an important part:

A middle-aged white woman was supervisor of a small records unit. She was a hard worker and the quality of her work was excellent. The people she supervised liked her and respected her judgment. She was referred to the psychologist as a last resort. Her immediate supervisor and the head of the department had decided to discharge this employee because of her chronic absenteeism.

In the past two years, this woman had been absent 17% of her working time. This was over and above her authorized vacation time. Yet, in all her absenteeism due to sickness, the examining physicians could find no organic basis for her complaints.

Psychological interviews revealed this woman felt inadequate in her job. She was under constant fear that she would be replaced. It had reached such a stage that the woman dreaded coming to work. It seems that her supervisor and the department head were quick to criticize and point out her weaknesses, but never praised her when she did a good job. She never realized that they respected her and were well-satisfied with her work.

To correct the situation, not only the patient had to be counseled; several interviews also were held with her supervisors. When the patient saw written statements from her supervisors praising her work and supervisory ability, she began to improve. Her supervisors soon realized the effects poor human relations had upon people and put forth a con-

scientious effort to let people know they were doing a good job. In the past six months, this woman has lost only one day of work due to illness.

The economic savings in this case are quite apparent. Management would have lost a valuable worker and would have spent needless money in replacing her. And, with earlier action, a great deal of her absenteeism might have been prevented.

Individual counseling service will have to be conducted on a limited basis. It is not profitable for management to retain a staff large enough to handle all cases, particularly when causes are extra-occupational. Referrals should be made to psychiatrists or psychologists in private practice.

STEP 3 · Training—to prevent mental and emotional upsets

Since the primary goal of any mental health program is *prevention*, education is one of the best ways to achieve the goal.

First-line foremen and supervisors are in the most important key spot to create mentally healthy working relationships. Education should be directed toward them first. But this normally means that *their* supervisors should also be brought into the training project at the same time. Like so many training activities, those involving mental health principles must be sold from the top-management level down. At higher levels, short "application sessions" may be all that is needed. But for superintendents and general foremen, full training is called for.

Supervisory training calls for practical lectures and discussions in everyday language on the how and why of the emotional problems of the average adult. Discussions should cover such topics as the psychology of motivation, how emotions affect physical well-being and work habits, why workers become hostile and troublesome, and how to help them to make better job adjustments. Well-known psychological principles underlie all these subjects, and qualified psychologists can readily outline proper courses of action for foremen.

Special training is also needed for plant nurses. The first-aid dispensary is the place where acute symptoms of adjustment problems often show up. Because of their background, it is easy to train nurses to look for important symptoms of mental and emotional disturbances.

How far to go in carrying training to the whole employee group is a tough problem. At best, general employee education on mental health is a slow process. It should not be undertaken hastily or pushed too fast. They need mainly to know that the company offers a medical health service to help them improve their ability to get along on the job and to derive satisfaction from it.

How the Smaller Plant Fits In

Close to 95% of all business and industry is small. Obviously companies with 100 to 500 workers—or even 1000—could hardly afford to have a full-time psychologist on the payroll. Most such plants don't even have a full-time doctor; some lack even a registered nurse.

It is doubtful whether a company of less than 5000 employees could afford a full-time psychologist exclusively for a mental health program. However, if a 2000-worker plant were to use a qualified psychologist for handling personnel research as well as mental health, his employment might be justified.

If a smaller plant has a full-time doctor, almost everything outlined above is possible. He may need refresher courses in psychiatry; normally, that is easy to arrange. Approximately two-thirds of the problem cases in any work force fall in the class of psychoneurotic behavior. A sizable percentage of these can be detected by an alert plant doctor in the initial physical examination.

To decide whether or not to hire "suspicious" cases, further psychological evaluation is often needed. This can be accomplished in several ways.

First, several companies could hire a psychologist on a retaining basis. Suspected occupational risks could be referred to the consulting psychologist for further testing and evaluation. Sharing the expenses of the psychologist would make it economically possible to keep a sizable group of potential problem cases from getting on the payroll. Also, by using a retainer system, it might be possible to have a consulting psychologist conduct orientation lectures on mental health and to counsel some of the problem cases already employed.

Another solution to this problem would be to make a contract with a local college or university for psychological testing. The physician could refer those cases involving potential maladjustments to the university for initial testing and interviewing.

"Should a worker who has a past history of hospitalization for mental illness be hired?" A good question. For the answers to this and other questions frequently asked about mentally ill employees, turn to page 294.

JOE'S DEPARTMENT

ELECTRICAL IDEAS EVERY PLANT MAN CAN USE

By JOE ST. ANDRE • Electrical Editor, FACTORY

• CURE FOR FROZEN LOCKS

Ever try to open the gate to your outdoor substation to do emergency switching in the winter time—and then find the lock frozen solid so you can't even get the key started? That's what I call real frustration, pals.

G. E. Hervey of Appalachian Electric Power Company did something about it. He found that by dipping a key into an undiluted anti-freeze solution and inserting the key in the lock several times, he didn't have to worry any more. One application was found to be sufficient for the winter. And they do have winters in the district where Mr. Hervey works. No injurious effects on the locks were noted.

Winter will soon be here. The above treatment may save many minutes of plant outage lost while trying to get into that outdoor sub.

• FLUORINE IN YOUR BATTERIES

Many municipalities now add fluorine to their water to combat tooth decay. You may be using this same water in your industrial truck batteries.

Is this good practice? Well, Gould-National has tested water so treated in its laboratory at Depew, N. Y., to see if it is harmful when used to replace water evaporated from industrial truck batteries. No harmful results were noted. So if you have been using drinking water in your batteries after having it analyzed as safe, keep on using it even though fluorine is now being added.

• AIEE BEATS BOARDWALK

The recent convention of the American Institute of Electrical Engineers held in Atlantic City had to be extra good. Competition with the boardwalk and the beach was terrific. But most of the speakers more than held their own.

R. M. Besse of Cleveland Electric Illuminating Co. did an outstanding job. In his talk on "Principles, Skills and Tools of Management," he outlined what management expects from engineering personnel and how electrical engineers could fill those requirements. Besse drew an overflow crowd. Quite different from the last meeting I attended in New Orleans. Can it be that electrical engineers are at last waking up to the problems of management and trying to find out what position they're going to play on the management ball team?

"Insulation of Rotating Machinery" also brought out a crowd. The problem here is how to find tests to evaluate insulation quality and life. Who wants to wait 8 to 10 years to find out if insulation is any good? One destructive factor seems to be the heating and cooling of insulation. Motors that run for long periods of time seem to outlive those that are started on and off on short-time intervals. Cycling two motors on one job to get longer life out of them may be false economy. It seems to be better to run one motor for a month at a time, then run the other, than to alternate them every few minutes.

If you have a lot of welders in your plant and they are a major part of your electrical load, you may be in for some special rate attention from your local power company. Welding loads under these conditions are almost impossible to meter with present-day instruments. Also, the power company may have to put in oversize transformers to service you in order that you may not cause light flicker to other customers. So if you are moving or putting up a new plant in the rural areas, get your power company's rulings on your welding loads.

Reliability of electronic systems got some attention from E. D. Cook of General Electric Company. It seems that manufacturers of electronic equipment are waking up at last to the needs of industrial plants.

Poorly designed electronic equipment from the mechanical and electrical standpoint has no place in industrial plants. Designing a television set for the home where it sits in the parlor and a controller that sits on a punchpress are two different problems. The sooner electronic designers realize this fact, the sooner industrial plants will take to electronic controls.

This seems like a good spot for me to bow in the general direction of Schenectady for all the help Mr. Cook gave us in our report on electronic controls (page 118).

• LAST ON, FIRST OFF

R. K. Farrington, vice-president of The Thompson Electric Company, has this to say about lighting maintenance in industrial plants:

"Lighting maintenance suffers in both good times and bad. In bad times it is easy to justify laying

off the lamp cleaners temporarily because they are indirect labor. In good times, the men hired for maintenance are likely soon to be transferred over to productive labor groups because there is a shortage of labor at this time. It is only in those rare periods when money is plentiful and labor readily obtainable that lighting gets the attention it deserves. Isn't it true in your plant?"

I might add, Mr. Farrington, that truer words were never spoken. But this situation isn't confined to lamp cleaners. Maintenance men are the first to get laid off and the last to be put back on. And electricians being in the higher wage brackets get priority.

Thompson Electric, incidentally, makes fixture hangers with the maintenance man in mind. These hangers permit the fixture to be lowered to the ground where the reflectors can be cleaned and relamped. Making maintenance easy is one way to make sure maintenance will be done.

• FIRST ON, LAST OFF

Putting locks on disconnect switches so they can't be closed while men are working on the equipment, is an old trick. And a good one.

But who owns what lock on the switch is sometimes a problem. A millwright walks away from the machine and forgets to remove his lock. Another problem that often comes up is how to actually get three or four locks on the switch handle.

Here is the answer I saw at the Lone Star Cement plant in Roanoke, Va.:

The chief electrician uses ordinary cylinder locks—same kind you bought for your boy's bike. They have brass tags on them to show what department owns them. Whenever a machine has to be "tagged out," the electrician slips on his cylinder lock. The other trades come along and slip on their locks.

But the trick is that the electrician can't remove his lock until all the others have removed theirs. In other words, he must be the first on the job to lock out the machine and the last on the job to close the switch.

• TWO PLANTS VISITED—AND NARY A GRIPE

I admit I do a lot of griping in this department. So much, in fact, that what I think of laughingly as "my public" will doubtless be glad to know I recently visited a couple of plants where everything electrical was hotsy-totsy. I mean I saw ample evidence of sound thinking from the angle of the men who have to take care of the equipment.

By a curious coincidence, however, both plants are owned by companies that manufacture electrical equipment.

Hah! So that's why Joe found nothing to gripe about.

I can almost hear you leaping to that conclusion. But don't you believe it. I talked with operating men in both plants—and found they had to battle for electrical equipment just like everybody else does in every other industry. In fact, they had to battle even harder because their managements *really* know all the answers—and *really* had to be shown the need before giving the go-ahead.

Getting down to cases, here are some of the electrical aspects of these two plants that really impressed yours truly:

• At the new Westinghouse plant in Elmira, N. Y., which manufactures electronic tubes:

1. Thirteen unit substations to insure continuous power distribution.
2. Bus duct for flexible distribution of 480 volts throughout the plant.
3. Substations on balconies to keep them clear of shop traffic.
4. Separate bus duct for welding operations so that heavy welding currents don't disturb other power distribution.
5. Equipment painted in aluminum or light colors to show up dirt.
6. Plenty of space plus conduits in the floor, to provide for expansion of switchgear equipment.

• At General Electric's Appliance Park, Louisville:

1. Unit load center substations in "penthouses" to keep them out of traffic.
2. Metered feeders on central switchgear so that power can be allocated for cost purposes.
3. An annunciator panel to watch over feeders and register disturbances in the system.
4. Huge electric drying ovens run at 460 volts to hold down installation and operating costs.
5. Oven controls and main contactors in individual rooms for easy maintenance.

• NOISY AIR CONDITIONING

I visited a plant recently to talk over a prospective article with the general manager. The maintenance department had just installed a new air-conditioning unit in his office and it was so noisy we had to adjourn to the plant cafeteria to hear ourselves think.

Do you know what we were talking about? Quiet motors, believe it or not. Can't you guess that the man I was talking to had a lot of ideas concerning the problem?

FACTORY MANAGEMENT AND MAINTENANCE

330 West 42nd Street, New York 36, N. Y.

Memo to Readers:

Keep on reading -- or else you'll miss three important articles and nine idea-packed departments.

For instance...

Same flow charts you use to plan and schedule production will work in maintenance, too. See booklet 25 in Important New Catalogs, beginning on p. 154.

Photos saved $1250 on a piping relayout job. Details in Maintenance Pointers, p. 156. And a dozen other good ideas.

Quick-change import may be your one-machine maintenance shop. Buy some attachments - and you're in business, ready to do more than 50 different jobs. What's New in Equipment, p. 166.

Tired? overworked? lazy? or just plain dabblers in "The Fine Art of Goldbricking?" A half-kidding article with a no-kidding point, p. 235.

"Dear boss--wish you was here." Should employees write the classic postcard greeting -- from jail? Look for the answer in Practical Labor Relations, p. 246.

Details can easily swamp the best doers in your organization -- if you don't "Train 'Em to Delegate Responsibility," p. 262. (Maybe you're swamped, too.)

Plugged drains come unplugged in a hurry if you own one of those new hydraulic rams announced in Plant Engineering Problems, p. 282.

Typewriter control for inventory? One of the hatful of valuable new ideas in Plant Operating Problems, p. 288.

Brafoam is "soft as a cloud" (it says here) -- and has many possible uses in industry. It's skidproof. Absorbs shocks. New Materials, p. 302.

Any plumbers in town? Just a sample of the more than 100 questions that will help your company decide "Which Community to Build in." Turn to p. 312.

Need help with your problems?

IMPORTANT NEW Free CATALOGS

. . . they're the cream of this month's crop . . .They describe latest methods and equipment. Tell us which ones you want. Use the handy coupon at the bottom of the page. If somebody beat you to it, there's another on page 278.

ELECTRICAL EQUIPMENT

1 Hoist Controller
Folder 9300 illustrates and describes a magnetic control for cranes and hoists operated by a-c wound-rotor motors. Gives features and operating data. Lists advantages for precision handling applications. 4 pages. The Electric Controller & Mfg. Co.

2 Motor Starters
Here's an 8-page bulletin describing four types of a-c motor starters, NEMA sizes 0-3. Illustrations show operating arrangements and construction. Bulletin No. 14B7132A. Allis-Chalmers Mfg. Co.

3 Panelboards
Complete design and operating details on manufacturer's panelboards are features of Bulletin No. VP-450. Includes dimensional data and horsepower ratings. Specs. Bulldog Electric Products Co.

4 Portable Power Tools
Catalog No. 537 is a complete guide to selecting maker's portable power tools. Numerous illustrations include a nail centering and driving tool. Features and specs. 30 pages. Syntron Co.

5 Measuring Equipment
Information on more than 115 testing and measuring devices is to be found in this 64-page catalog. Includes electric-circuit and high-voltage a-c- and d-c-testing equipment; materials testing and inspecting equipment; leak detectors, pressure and vacuum gages, and electronic equipment. Applications, advantages, and specs. GEC-1016A. General Electric Co.

LUBRICATION

6 Lubricating System
Bulletin No. 26 tells you about centralized systems of lubrication. Step-by-step diagrams show how they operate. Illustrated case studies. Section on fittings and accessories. 20 pages. The Farval Corp.

7 Lubricators
12-page catalog describes manufacturer's line of force-feed lubricators. Functional illustrations, operating data, and applications. Dimensions and specs. Section on miscellaneous fittings and information on how to order lubricators and fittings. Catalog 25G. Manzel.

DUPLICATE COUPON ON PAGE 278

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PIPELINES AND FITTINGS 274
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Remington Rand Methods News

KEEPING A FINGER ON 12,000 ITEMS: For an over-all cost of 12½ clerical units, National Motor Bearing keeps accurate, centralized control of 12,000 different items in 7 plants and warehouses. This battery of automatic machines also simplifies payroll procedures and produces reports for analyzing all sales.

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Let our manual of personnel administration record keeping show you money-saving short cuts you can take. This manual shows how specific skills can quickly be located. It tells how to answer 80% of all Personnel Department phone calls – in mere seconds. It points out how you can maintain control over punctuality, vacations, etc. And it gives you examples of other profitable Personnel Department procedures. Ask for **X521.**

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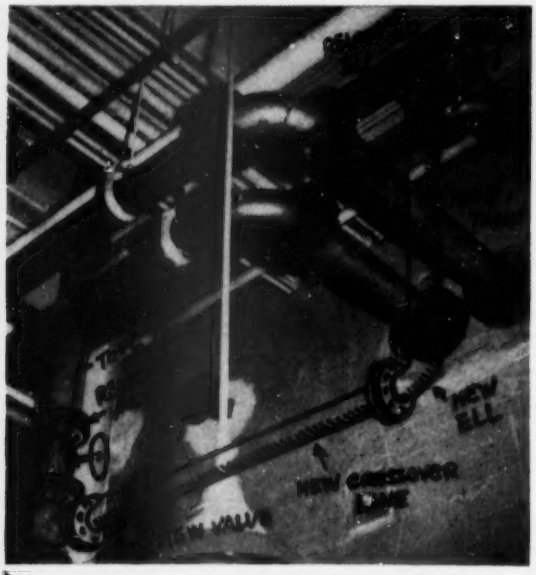
1-14

Profit-Building **IDEAS** For Business

MAINTENANCE POINTERS

FOR PLANT OPERATING EXECUTIVES

By CARL G. WYDER • Maintenance Editor, FACTORY



If you've got an equipment relayout job, try . . .

. . . Photography—a New Tool for Cutting Maintenance Costs

Not a brand-new idea. But we think plant engineers are a bit slow in catching onto its many benefits. Certainly this impressive case from the May-June *Ansconian,* plant organ of Ansco Division of General Analine & Film Corporation, Binghamton, N. Y., ought to prove the worth of photography.

The piping illustration above is almost self-explanatory. It's actually a photograph with a transparent overlay. But it shows the simple method used to prepare engineering plans for an annual overhaul of a complicated factory piping system which had to be taken down, cleaned, and reassembled with several changes.

This same job had previously cost about $25,000, part of which went for weeks of engineering labor on the drafting boards. Flash photographs of the entire installation took only three days, saved $1250 in labor, also weeks of drafting time.

After the entire piping system was photographed, three sets of 11x14-in. enlargements were made of the best views. One set was used in the planning conferences, one by workmen on the job, one for engineering files.

Except for one new part of the job, where detailed scale plans were needed, draftsmen sketched all the piping changes in pencil on drafting paper superimposed on the photographs. From these sketches they reproduced three sets on Ozalid Sepia Foil as overlays for the photographs.

Workmen had no trouble interpreting the "working" drawings. In fact, the job needed less skilled supervision—which meant a further cut in cost.

What Happens When Acoustical Surfaces Are Cleaned or Painted?

Do acoustical materials lose their ability to absorb noise when cleaned or painted?

Two physicists from National Bureau of Standards—Peter Chrzanowski and Albert London—reported on this important question more than two years ago at a symposium of the American Society for Testing Materials. More recently, ASTM has published a 40-page booklet which includes their report on "Maintenance of Acoustical Materials" ($1 from ASTM, 1916 Race St., Philadelphia 3).

We think this report is so helpful to those who face this problem that even at this late date we recommend it. The authors discuss the subject from the ground up, dealing with proper selection of acoustical surfaces, proper application, allowable cleaning and redecorating methods. They report the results of acoustical measurements on various cleaned and redecorated surfaces.

Should you wash dirty surfaces? Only the hard-surface or perforated-pan type, say the authors. Not the fibrous type, which are water absorbent.

How good is vacuum cleaning? Only for removing larger lint or dust particles—heavier suction or abrasion will destroy the delicate materials.

How about sanding the surface? That has its limits, too.

So, you may conclude, painting over the dirt is the only solution left. You're wrong. One injudicious coat of paint may ruin some non-perforated types of materials. Perforated and most fissure-surfaced materials offer no problem as to painting so long as perforations are not bridged over. Some sprayed-on acoustical materials can stand multiple repainting. But watch out for tiles and plasters. Don't brush-paint; spray-paint them carefully.

Turn the page

In hydraulic systems

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These pointers give you an idea of the practical problems of cleaning and painting acoustical surfaces. The report does not give all the answers. In some cases there is no answer. But it will serve to warn you where you should be careful and what you can't do if you want to preserve the sound-absorbing properties of an acoustical surface.

Don't Say Radioisotopes Are Not Yet For You

Every day reveals new achievements for radioisotopes in industry. The plant engineer who shuts his eyes to this tool may pass up an easy answer to a tough maintenance problem.

Latest "easy answer" to come our way was at Eastern States Petroleum Company's refinery in Houston. Problem faced by Herschel Martin, chief engineer, and Jack Dalberg, chief inspector, was to inspect a steel reactor for hydrogen blisters.

This reactor is 20 feet high, 5½ feet in diameter. Walls are 2⅜ inches of steel, surrounded with a 5-in. covering of concrete, with a ⅛-in. chrome steel liner.

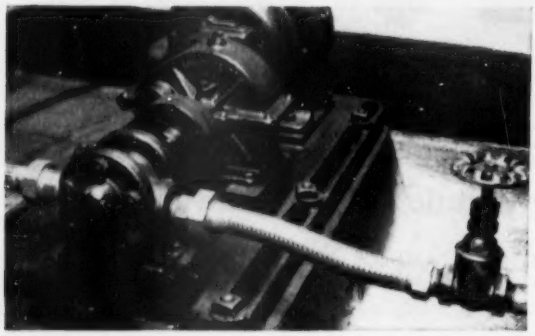
Want this inspection job? How would you handle it? The Isotopes Products, Inc., also of Houston, said it was "just our meat." A crew of men taped sheets of X-ray film all round the steel tank from top to bottom. Each film was coded and cataloged as to its exact position.

Then they loaded a capsule charge of Iridium 192 radioisotope into a special shielded "camera" and lowered it by a steel cable into the reactor. After exposure the films were removed, developed, and interpreted by an expert. Simple as that.

In case you want to explore the use of radioisotopes, FACTORY has already made it easy for you. April issue (pages 84-95) has a complete survey.

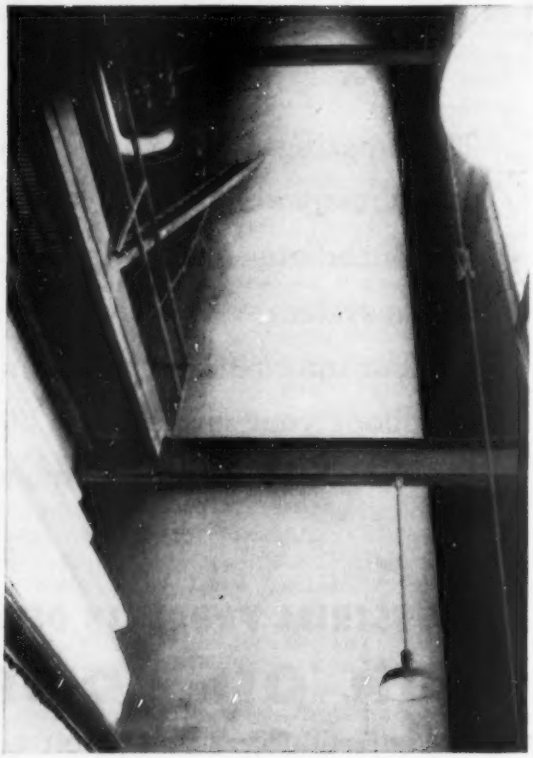
Turn to page 282 for good ways to solve special plant engineering problems.

IS THIS YOUR MAINTENANCE PROBLEM?



FLEXIBLE HOSE (Titeflex) connections eliminate strain on fuel-oil pump bearings at Wheatena Corp., Rahway, N. J. They have gone 5 years without repacking. Solid pipe used to throw pump out of alignment, require repacking twice a year.

TO BUDGE STUDS on disassembly jobs, Abney Mills (Anderson, S. C.) thinks there's nothing like Ingersoll-Rand Impactools. It uses four of them for all sorts of maintenance, repair, and installation work. Joe L. Burriss, master mechanic, says a craftsman doubles his output with this power tool.



TOO MUCH HEAT from a 12-ft. inside stack led Central Illinois Public Service Company to insulate the stack with 2½-in. blocks of 85% magnesia, plus finish coats of asbestos and cement and an 8-oz. canvas jacket. Surface temperature dropped from 260 F. to 25 degrees above ambient air temperature.

TALK ABOUT
Heavy-Duty Concrete

OVER 26 YEARS' EXPENSE-FREE SERVICE

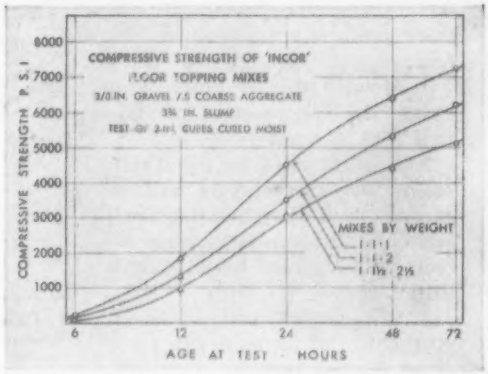
in this Indianapolis Freight Terminal loading dock—concreted with 'Incor' in 1927, over week-end, no traffic tie-up.

For LONGER-WEARING HEAVY-DUTY FLOORS, be Sure to Specify 'INCOR,' America's FIRST High Early Strength Portland Cement

● Have you a floor problem? Best solution is *real* heavy-duty concrete—facts bear this out. Recent condition survey, covering cross-section of industry, proves EXTRA DURABILITY and WEAR-RESISTANCE of heavy-duty concrete made with 'Incor' 24-Hour Cement. After 26 years' hardest service, 'Incor' loading dock, above, shows not a single rut or broken-down joint—typical 'Incor' performance.

'Incor' concrete is service strong, ready to use, in 24 hours . . . cures THOROUGHLY in one day, instead of a week or longer. No need to let spilled loads and trucking delays slow production—rebuild floors with 'Incor'* over a week-end... no plant tie-up, lowest annual cost through extra years of service.

Write for booklet, "Concrete Floors,"—address Lone Star Cement Corporation, Room 1501, 100 Park Ave., New York 17. *Reg. U.S. Pat. Off.



Dependable 'Incor' high early strength means a floor ready to use 24 hours after placing. Fast, thorough curing assures greater wear-resistance, water-tightness, less absorption . . . explaining outstanding 'Incor' performance in heavy-duty service of all kinds.

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LONE STAR CEMENT, WITH ITS SUBSIDIARIES, IS ONE OF THE WORLD'S LARGEST CEMENT PRODUCERS: 18 MODERN MILLS, 129,000,000 SACKS ANNUAL CAPACITY

maintenance data sheet 198

By A. F. MATHEIS • Assistant Vice-President
Thermoid Company, Trenton, N. J.

How to Splice Rubber Conveyor Belts

A conveyor belt is as strong as its weakest splice. That's why belts last longer if spliced right. Before you make a splice, consider the service you expect the belt to endure—for instance, don't pick a light-duty splice for a heavy-duty application. Then follow the procedure described below.

Two Kinds of Splices

You can splice belts with metal fasteners or by vulcanizing.

Metal fasteners are used more often because they're easier to install, call for no special tools or skills. There are three types:

1. Staple-type fasteners—for light and medium duties.
2. Hinge-pin fasteners—for flat belts and package conveyors.
3. Double-plate, bolted fasteners—for heavy duties.

Vulcanizing is recommended where:

- Long centers and high lifts result in extremely high tensions.
- Belt conveys wet materials or operates in a moist atmosphere.
- Splice failure would seriously interrupt production. Vulcanized splices last longer and need less inspection and maintenance than fasteners.
- Temperatures (ambient or of material conveyed) are high. Metal fasteners transfer heat fast to the inner carcass, may cause charring.

Preliminary Steps for Splicing

Whether you're splicing with metal fasteners or by vulcanizing, these preliminary steps are necessary:

1. Mount roll of belting on strong stand at point of installation.
2. Unwind belt from top of roll. Make sure correct side will be carrying load when belt is spliced. Some manufacturers indicate direction of forward travel. Check this.
3. Slacken off belt's take-up mechanism as far as it will go to allow for belt stretch.

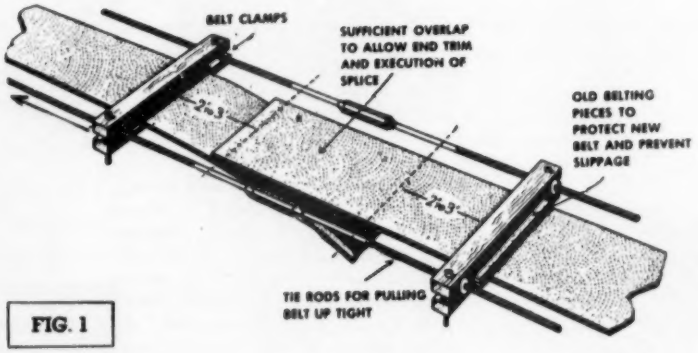
BELT CLAMPS
SUFFICIENT OVERLAP TO ALLOW END TRIM AND EXECUTION OF SPLICE
OLD BELTING PIECES TO PROTECT NEW BELT AND PREVENT SLIPPAGE
2 to 3'
2 to 3'
TIE RODS FOR PULLING BELT UP TIGHT

FIG. 1

4. Select roomy area to make splice. Consider head-room, elbow room, light, safety, ventilation, and dryness. At place selected, remove enough belt carriers to provide sufficient room for the splicing equipment.

5. Belt ends can be pulled together with block and tackle—fastened through holes punched three inches from end of a light belt, or attached to a bolted clamp on a heavy belt. Pull ends together slowly, checking constantly to make sure belt is not snagged, creased, or subject to damage at any point. Ends should overlap enough so that holes punched for block and tackle can be cut off.

6. Apply a set of belt clamps (Fig. 1) 3 feet from one end of belt and as far as tie rods reach on the other end—preferably 2 to 3 feet. To protect belt surface and keep clamps from slipping, put strips of old belting under clamps.

7. Remove slack by taking up on tie rods.

8. Make sure belt is dry. This is particularly

Alemite "Friction Fighters"

save manufacturer $22.70 every 8 hours!

Increase output 11% on one machine...completely eliminate lubrication downtime

Lubrication trouble on a key machine created a real problem for a leading manufacturer in America's canning industry. Lubricant was being wasted by the gallon. Shutdowns were frequent. Delays on this single machine slowed production throughout the plant.

That's when a trained Alemite "Friction Fighting" specialist was called in. On his recommendation, an Alemite Automatic Lubrication System was installed. This amazing system—one of four different types made by Alemite—provided an exact amount of lubricant *to all bearings of the machine—from one central point—without shutdown!*

Results were astounding! 40 minutes of productive operating time were added to each 8 hour shift. Man power required for lubrication was completely eliminated. Consumption of lubricant cut from 2½ gallons per shift to only 10 ounces. Estimated savings—$22.70 every 8 hours! A total of $5902 a year!

An Alemite lubrication engineer can show *you* how to cut costs, decrease down-time, increase profits. For further information, contact your Alemite distributor—today!

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Alemite Accumeter systems give you automatic lubrication... uninterrupted production

From one central point, Accumeter automatically measures and delivers lubricant to *all* bearings—while the machine is in motion! Does it in a fraction of the time required for hand-gun lubrication. No downtime... no points missed!

Please send me **FREE** *New Booklet*

☐ "11 Ways to Cut Production Costs"

☐ Include facts on "Oil-Mist"—the amazing new system that atomizes oil, circulates it to bearings under pressure.

Alemite, Dept. G-93
1850 Diversey Parkway, Chicago 14, Ill.

Name .....

Company .....

City ..... State .....

HOW TO SPLICE RUBBER CONVEYOR BELTS

Begins on page 160

important when vulcanizing the splice. To dry belt, use an infra-red lamp or similiar heating unit. Do not heat above 250 F.

9. Mark center line along top cover at each end of belt. Mark ends for cutting at right angles to center line. Use a steel square—belt edges are not reliable guides for squaring.

Now you're ready to cut the belt.

When You Splice by Vulcanizing

Using a sharp knife, cut belt ends so that they overlap, and seal them with rubber cement to keep out moisture.

How much overlap? It should be one less than the number of belt plies times 9 inches.

For example: A 7-ply belt would have overlap of $7 - 1 \times 9$ inches, or 54 inches.

Now you're set to:

1. Cut "steps" for the splice.
2. Join the splice.
3. Vulcanize the joint.

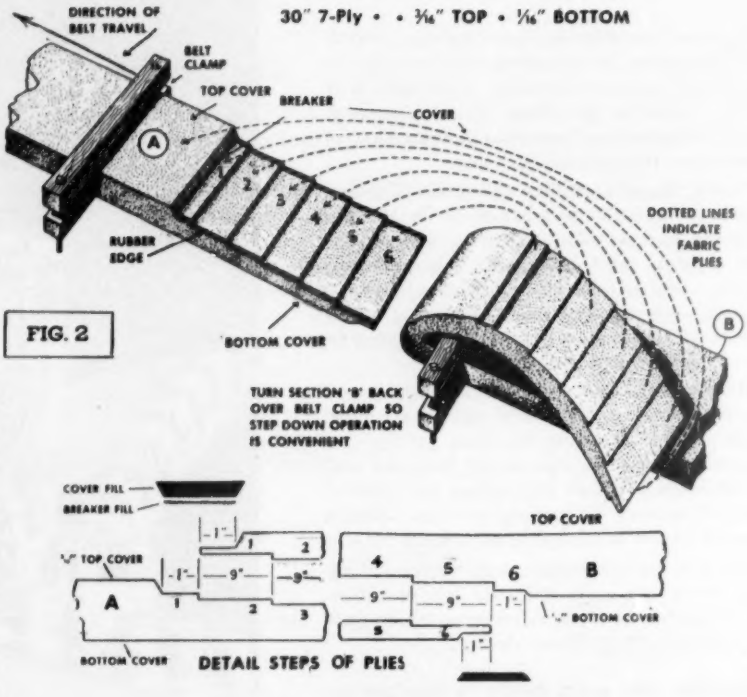

FIG. 2

CUTTING THE STEPS • How many steps? One less than the number of plies in the belt. In other words, a 7-ply belt should have six steps.

In Fig. 2, note direction of belt travel and that belt section A is below section B. Section A's steps should be made from top cover down and section B's from bottom cover up so that whole splice will pass over pulleys ahead of exposed seam. This progressive support prevents fraying and concentrated stress.

Note number of each step and dotted lines showing matching positions. Also note dimensions of each step.

Start with belt section A, and cut back each step as shown. Work from top cover down through belt.

Mark belt section B so that its steps will align with those in section A. Turn section B back over belt clamp so that bottom is up. Cut steps in section B, working from bottom cover through belt.

In tearing down steps, be careful not to cut into ply below the one being removed for step.

Best way to rip off steps: Turn up 1 to 2 inches along one edge of ply being removed. Slice this turned-up edge every 2 inches. Then grab each 2-in. strip with pliers and tear it free across ply.

JOINING THE SPLICE • Next job is to prepare surfaces to be joined. To do so:

1. Using coarse emery cloth, scrape each set of steps.

2. Provide for seam. Remove 1-in. wide cover strip (and breaker strip, if present) from top of belt section B (above step 1) and from bottom of belt section A (below step 6).

3. Clean all cut surfaces thoroughly with carbon tetrachloride.

4. Make sure fabric plies are dry.

5. Apply two coats of rubber cement to all steps. Let first coat dry before applying second coat.

6. After cement has dried, put strips of thin tie gum across edge of each step. Each strip should be wide enough to cover riser and extend about ½

[redacted]--on a sugar plantation in Africa...in a molybdenum mine in Colorado...for a new highway in Nova Scotia...to extend jet plane runways at Fort Benning. Ga.--these are typical of the many and varied jobs where Caterpillar-built equipment proves its superiority. The DW10 Tractor with No. 10 Scraper, shown above, and many other earthmoving units are built by Caterpillar Tractor Co., Peoria, Ill. And, A. M. Castle & Co. is proud to be a factor in the production of these outstanding, world-famous earthmoving units.

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HOW TO SPLICE RUBBER CONVEYOR BELTS

Begins on page 160

inch across horizontal surfaces above and below riser.

Now splice can be joined. Make sure all surfaces and abutting edges are aligned and that no air is trapped between belt sections A and B.

If belt has a breaker strip, set in an extra strip of breaker 2 inches wide at step 1. This strip should abut against edges of stepped-back breaker in belt sections A and B. Cement strip and allow to dry.

Fill in top and bottom seams with new rubber stock, skiving off excess so surface will be smooth. Apply rubber cement on exposed edges of belt, and put thin layer of rubber cover stock over this portion.

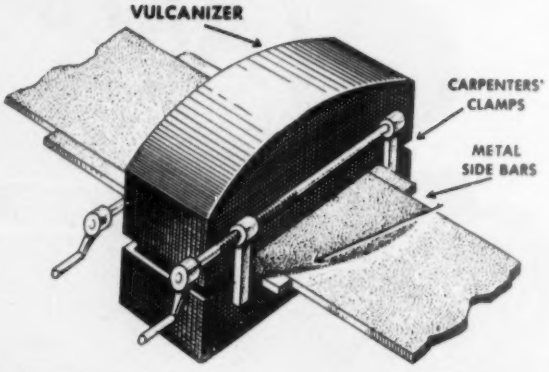


FIG. 3

VULCANIZING THE JOINT • Figure 3 shows how a vulcanizer is applied. Metal side bars, same thickness as belt, confine belt edges during cure. Carpenter's clamps on each side control position of side bars.

How many heats are necessary? Depends on size of vulcanizer and length of splice. Cure for each heat will vary from 30 to 45 minutes at 290 F.

Fig. 4 shows how heats should overlap. First heat should overlap bottom seam by about 3 inches. Each heat thereafter should overlap the preceding heat by 2 inches. Final heat should overlap top seam by 3 inches.

After vulcanizing, trim rubber that may have flowed out on edges.

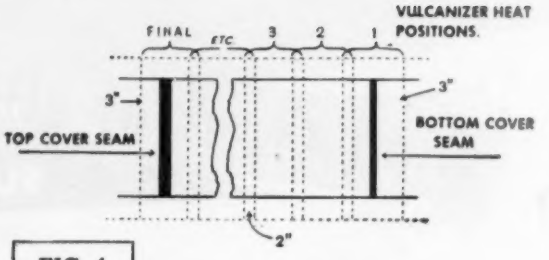


FIG. 4

When You Use Metal Fasteners

Follow preliminary steps for splicing starting on page 160. Then cut belt ends so they just meet. Immediately apply rubber cement to cut ends to keep out moisture and prevent mildew.

If belt will carry fine bulk material such as coal or sand, put a strip of light duck or herringbone tape between fastener and top cover of belt. This will prevent fines from sifting through the splice between the belt ends.

Staple-type fasteners • Cut steel strip of fasteners into length slightly less than width of belt. Set strip on belt to straddle seam. Place soft board underneath. Drive fasteners through belt and clinch staples on underside. Although staples fit tightly into holes they make in belt, make sure moisture won't reach carcass by sealing holes with rubber cement.

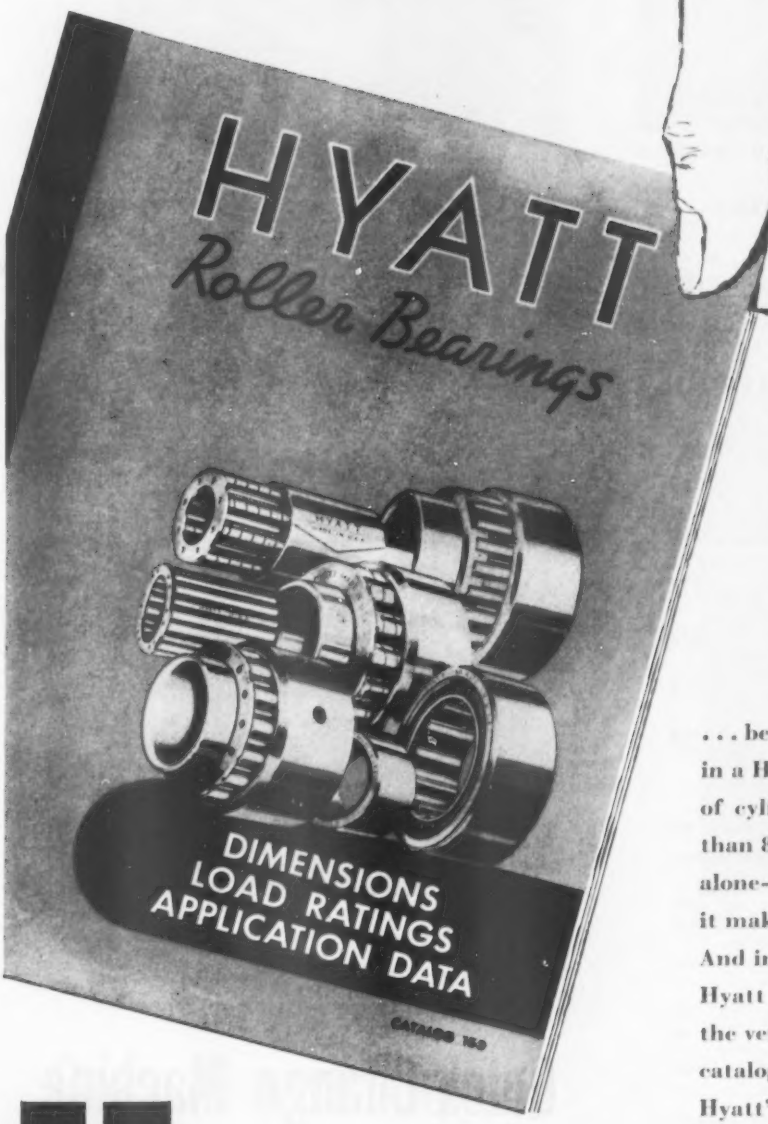
Hinge-pin fasteners • Cut mating strips into proper lengths, slightly less than width of belt. Set each strip evenly along edge of belt and drive open jaws home with a light hammer. Mesh hinges and insert hinge pin.

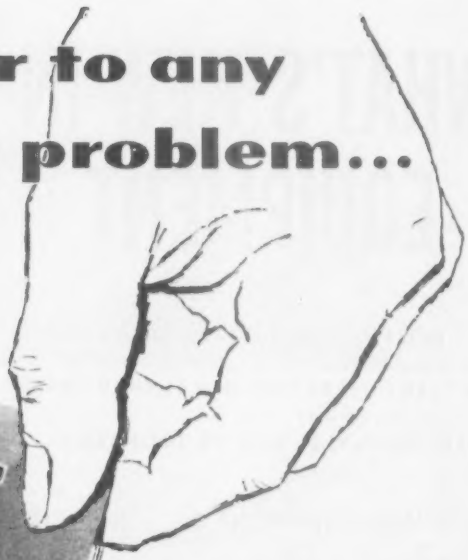
Double-plate fasteners • Choose enough plates for width of belt on both sides. Set plates on top cover to straddle seam. Mark and punch tight-fitting holes in belt. Cement insides of holes to keep moisture out of carcass. Apply plates, insert bolts. Sometimes rivets are used instead of bolts.

After installing any metal fasteners, make sure they're tight as possible. Then remove belt clamps, and restore carriers to their original positions.

Remove all tools and other materials from belt. Move belt slowly. After running belt without load, check splice. Sometimes double-plate, bolted-type fasteners can be tightened after belt has been run for short time.

The answer to any bearing problem...





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PLANT HOUSEKEEPING 218
SAFETY & PLANT PROTECTION . . . 222
VALVES & FITTINGS 224
MISCELLANEOUS 226

IN THE NEXT ISSUE . . . Some notes on important late items. More about them next month.

Multi-zone air conditioner provides heating and cooling from a single unit for up to 16 separate areas. Each area has individual temperature control.
U. S. Air Conditioning Corp., 3300 Como Ave., S. E., Minneapolis 14.

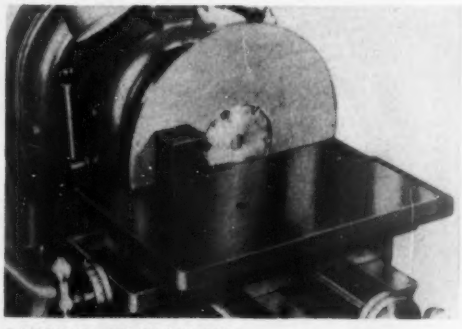
Chamfers and deburs both faces of metal sheets and plates from one side. The Noburmatic Tool can be used with portable motors or stationary machine tools.
Nobur Mfg. Co., 717 N. Victory Blvd., Burbank, Calif.

Molded plastic elevator bucket is said to outwear ordinary buckets by a wide margin. Dura-Buket is resistant to life-shortening corrosion and rust.
National Oats Co., East St. Louis, Ill.

Stepless temperature control will hold required process temperatures without under- or over-shooting. It employs no relays.
West Instrument Corp., 525 N. Noble St., Chicago 22.

Neoprene coating for cotton gloves, called Glove-Kote, lengthens life and adds to protective ability.
Industrial Adhesives, Inc., 4208 Airport Rd., Cincinnati.

THIS BASIC MACHINE can be equipped in 10 minutes with the right accessories to perform these jobs, plus many others.

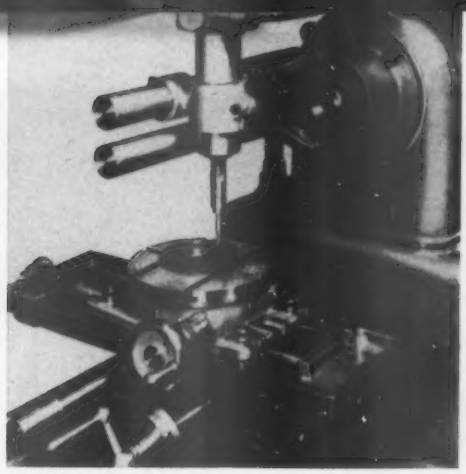


SANDING OR FINISHING

Quick-Change Machine

Want a multi-purpose machine tool for maintenance? This may be it. A metal-working machine . . . with 52 easily changeable accessories . . . is capable of performing over 50 different machining operations.

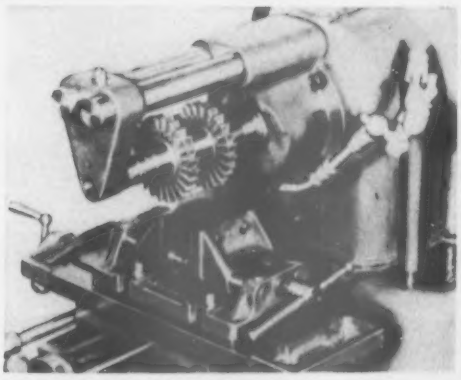
Only 10 minutes is needed to change the accessories for different operations. When an accessory



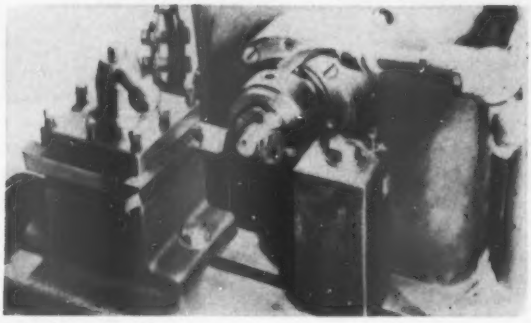
HIGH-SPEED ROUTING

SLOTTING

SURFACE GRINDING



HORIZONTAL MILLING



TURNING OPERATION

END MILLING

Does Almost Any Job

is fitted to the basic unit, the entire set-up becomes a single-purpose machine tool.

Spindle speeds ranging from 65 to 2800 rpm., in 24 steps, are produced by the vee-belt motor-drive of the basic unit.

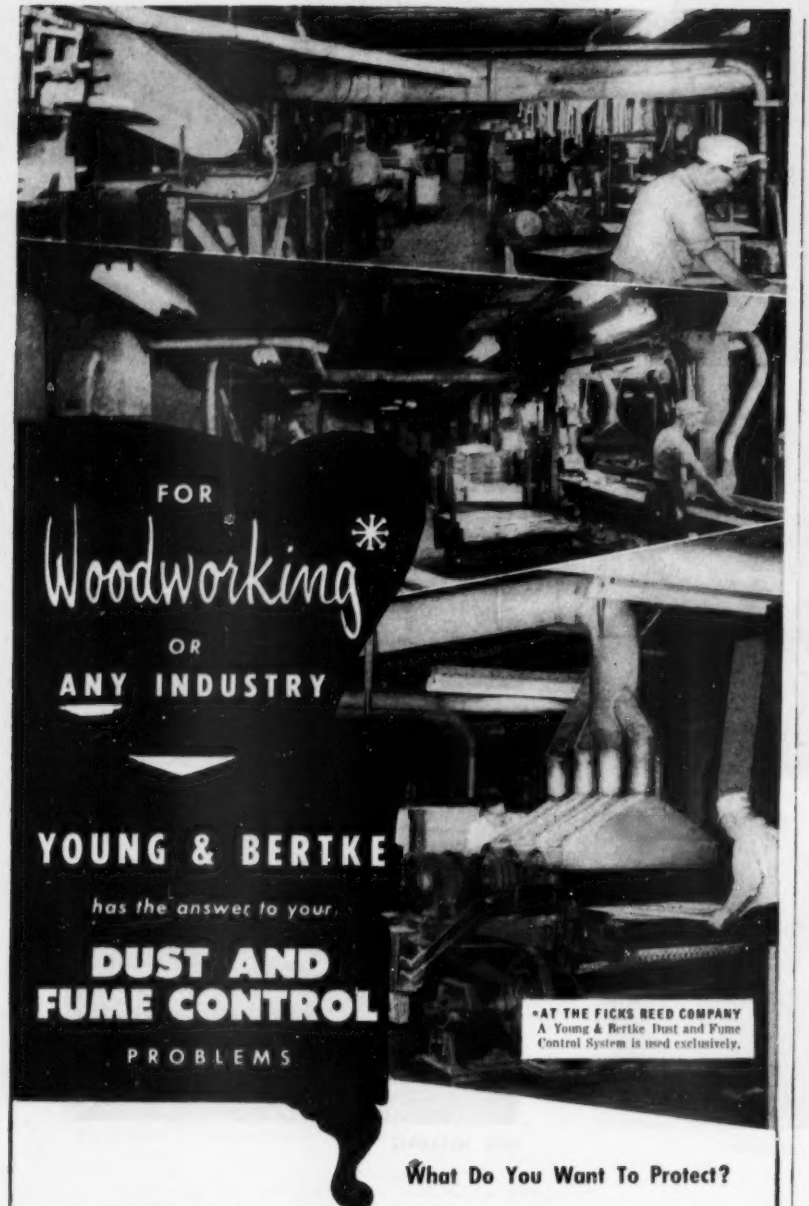
Two locating pads, machined at the front of the head, accurately position the various attachments. The spindle is prevented from rotating during the changing of accessories by a spring-loaded plunger.

Rise and fall compound table is provided with micrometer dials and a rack and pinion.

Typical maintenance shop machining operations performed by this machine, using the proper accessories, are: bandsawing, boring, end milling, face milling, keyway cutting, slitting, spur grinding, surface grinding, valve grinding, and woodruff keyway milling. The machine is also ideal for short production runs and mobile workshops.

Newage International, Inc., 235 E. 42nd St., New York 17.

Turn the page



What Do You Want To Protect?

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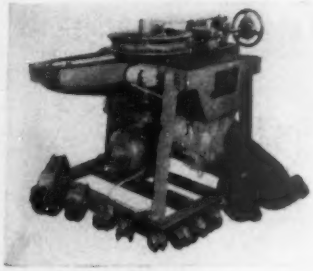
MAINTENANCE TOOLS & SUPPLIES



Pipe Bending Machine Speeds Installations

Designed for general plant use, this pipe-bending machine will bend ½- to 2-in. U. S. Standard Pipe to radii approximately 5 times the pipe size, up to 180 degrees.

The machine can be used to eliminate fittings and to speed up piping installations. It is driven by a 2-hp. motor.

The American Pipe Bending Machine Co., Poultney, Vt.

■

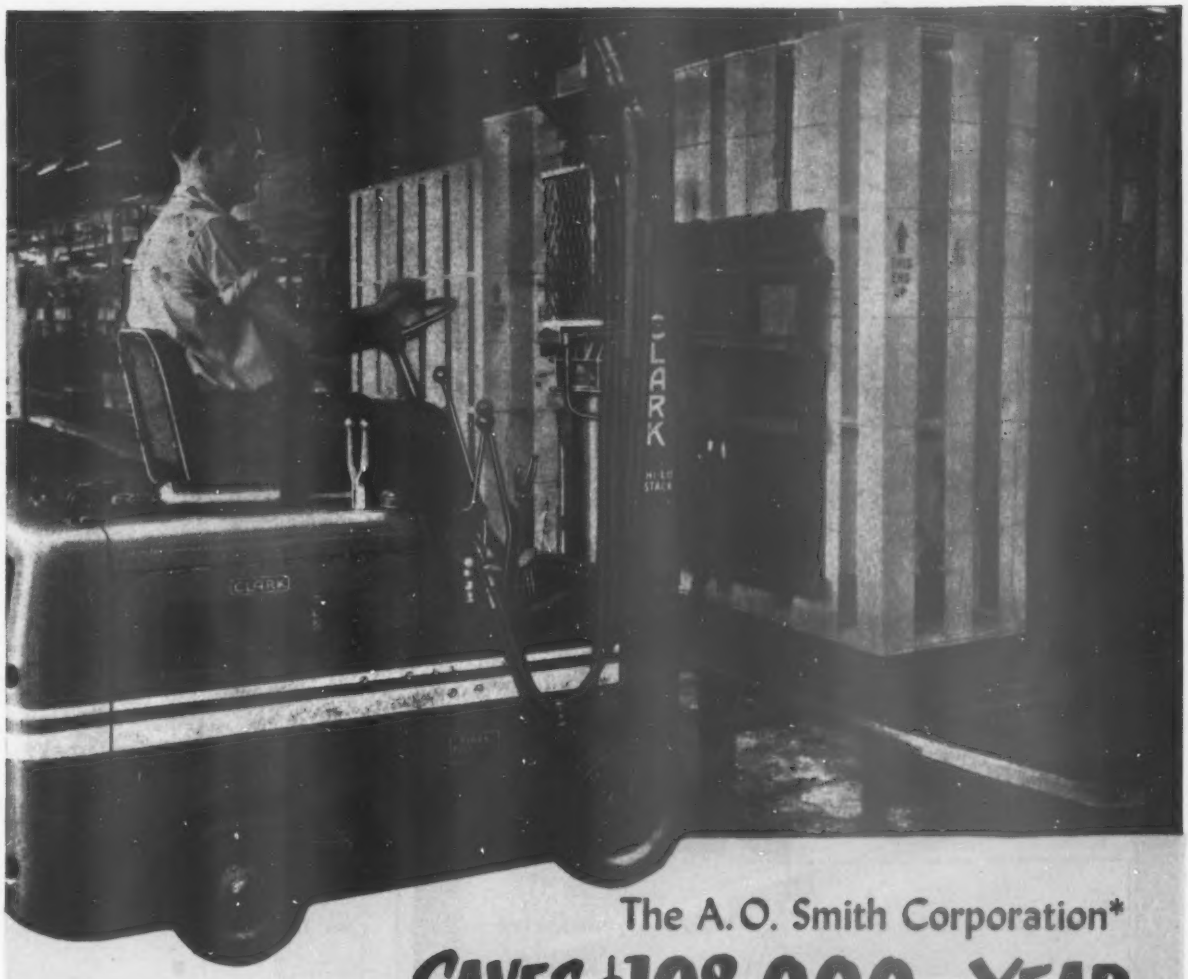
Wheelbrush Designed for Longer Life

A wheelbrush to provide longer life at no extra cost has been marketed. As the trim wears away, smaller side plates are put on the brush, thus exposing a new length of trim.

The brushes can be used either singly or in multiple units. Improved performance, increased maximum wheel speeds, insured balance, and extra safety are other advantages claimed by maker.

The Fuller Brush Co., Hartford 2, Conn.

Turn the page



The A. O. Smith Corporation*

SAVES $108,000 a YEAR

in materials handling!

WITH A SPECIAL "FINGER-LIFT" device for crate-handling, combined with a side-shifter attachment for their fork trucks, the A. O. Smith Corporation not only reduced labor costs $108,000 a year—they also eliminated $16,000 worth of pallets and made available 27 men and 3 trucks for other work!

As usual, CLARK plays a major role in this amazing savings achievement. Admittedly, not everyone can save $100,000 a year with modern handling equipment; but by the same token, you might save more, depending on the nature of your handling problem. Why not find out what's in it for you? Simply ask your CLARK Dealer to analyze your own particular handling activities. Don't pass up this opportunity for *really big savings!*

This is what the A. O. Smith Corporation accomplished:

1 **Saved 43,300 man-hours or $78,000 a year in shipping and warehousing.**

2 **Minimized breakage and damage to crates, saved $30,240 a year on repair labor.**

3 **Eliminated 4000 double-faced pallets costing $16,000.**

4 **Accomplished a 30% reduction in required storage area—crates are exactly-positioned in neat rows, two, three and four high.**

5 **Cut boxcar loading time in half—one car is fully-loaded in one hour flat, by one man.**

6 **Eliminated hazardous difficult labor—all lifting is done mechanically.**

1903 50 CLARK EQUIPMENT

* **Permaglas-Heating Division, Kankakee, Illinois Detailed case history available on request.**

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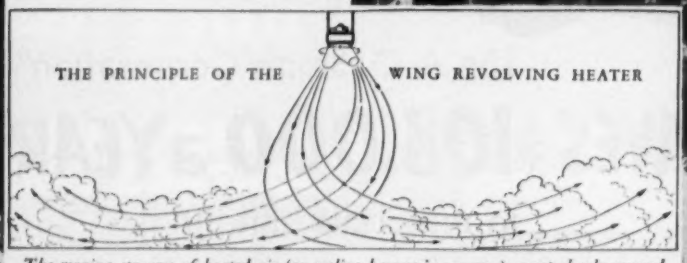
Address _____
City _____ Zone _____ State _____

AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

HEAT THAT MOVES AROUND

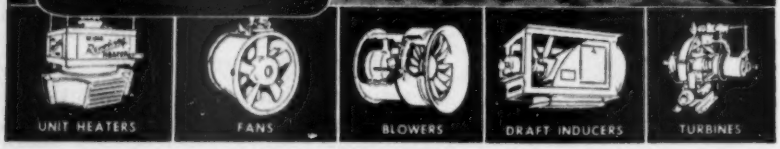
THE fact that the discharge outlets of WING Revolving Unit Heaters keep the heated air in constant, gentle motion is one of the reasons why nationally known firms like the Budd Company have installed them in their plants, both at Philadelphia and in the one shown in this photograph, at Gary, Indiana. The big blanking and forming presses in this great plant present a natural barrier to ordinary fixed discharge heating systems, but not to the moving streams of heated air from the WING Revolving Heaters, even suspended, as they must be, far above the floor, to clear the cranes. That is equally true in the summer time when, with steam turned off, the cooling breezes from the revolving discharge outlets keep workers comfortable on the hottest days. Investigate. Write for Bulletin HR-6.



The moving streams of heated air (or cooling breezes in summer) sweep slowly around through 360 degrees, covering successively every direction. The air velocity is sufficient to carry to walls, and remote corners and the constantly changing direction of flow causes the air to find its way around obstructions.

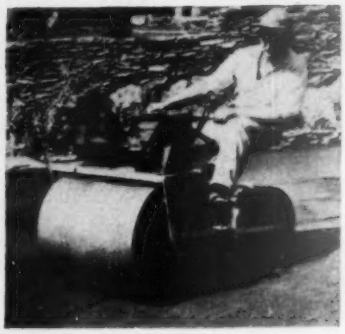
Wing

L. J. Wing Mfg. Co.
162 Vreeland Mills Road
Linden, New Jersey
Factories: Linden, N. J. and Montreal, Can.
In Europe: Etab. WANSON, Brussels, Belgium



NEW MAINTENANCE TOOLS & SUPPLIES

Begins on page 168



Roller Handles Maintenance Jobs

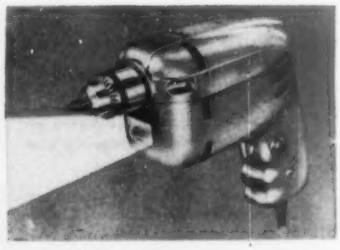
Here's a ½-ton roller, called Motoroller, that can be used for a variety of maintenance jobs.

Designed to roll confined areas as well as driveways and seeded lawns. Center-poise hook-up permits rolling right up to the curb or other obstructions.

Can be quickly transported from job to job and is economical to operate, the maker says.

Gabb Special Products, Windsor Locks, Conn.

■



Drill With Light for Dark Areas

Having trouble drilling in those dark, inaccessible areas? Here's a drill that will throw some light on the subject.

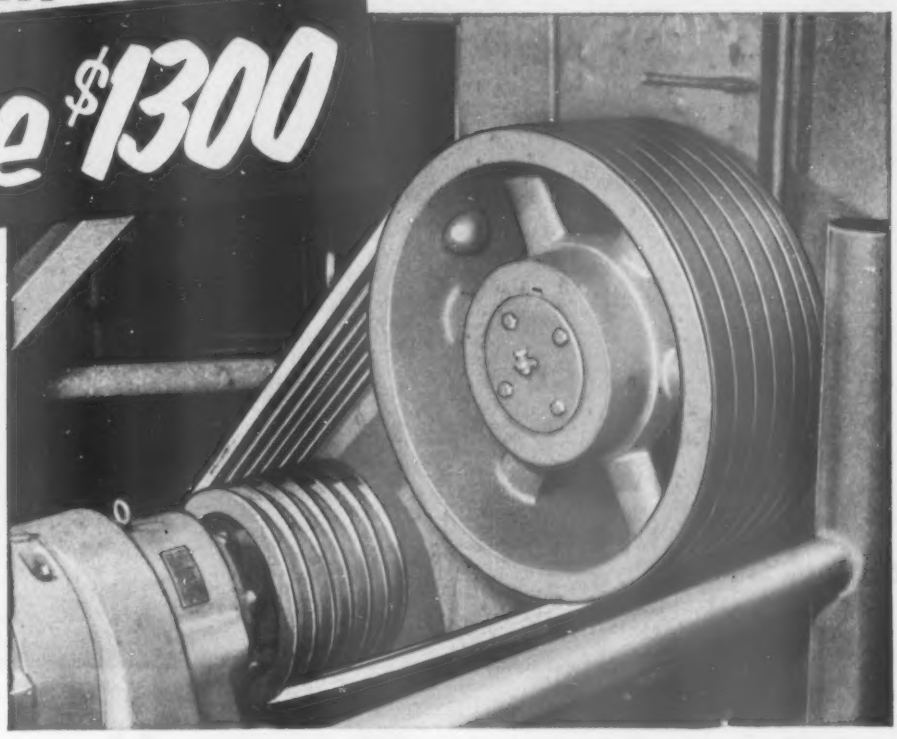
It combines a ½-in. standard-duty, portable electric drill with a built-in light. Work-Lite weighs only 3 pounds.

The unit has a universal-type motor rated at 2 amperes.

Fairchild Industries, Burlington, Vt.

Turn the page

See how V-Belt *Preventive Maintenance* can Save $1300



What is the *real* cost of replacing a set of V-Belts on a machine? Often it is far more than just the cost of belts.

For example: A dye works operates this heavy-duty calender which processes 500 feet of cloth per minute. The drive has 6 belts. Here's the cost when the calender is shut down for a belt change:

Cost of new belts	$ 120.00
Cost of labor	2.00
Cost of lost production during down time	1300.00
Total cost of belt change	$1422.00

Dayton V-Belt Survey Experts often can extend the time period between belt changes by 50 per cent—through installing Dayton V-Belts. In this textile plant, for instance, it would be possible to extend the time between changes from 5 to 7½ years. This, in itself, is a worthwhile saving. *But the real pay off comes from the elimination of costly down time through Dayton's Preventive Maintenance Program.*

You too can make BIG savings with Dayton V-Belts and Preventive Maintenance. Call your Dayton Jobber for further details. He's listed under "Belting" in your local telephone directory.

DAYTON RUBBER COMPANY • DAYTON 1, OHIO

Dayton Rubber

Since 1905

WORLD'S LARGEST MANUFACTURER OF V-BELTS

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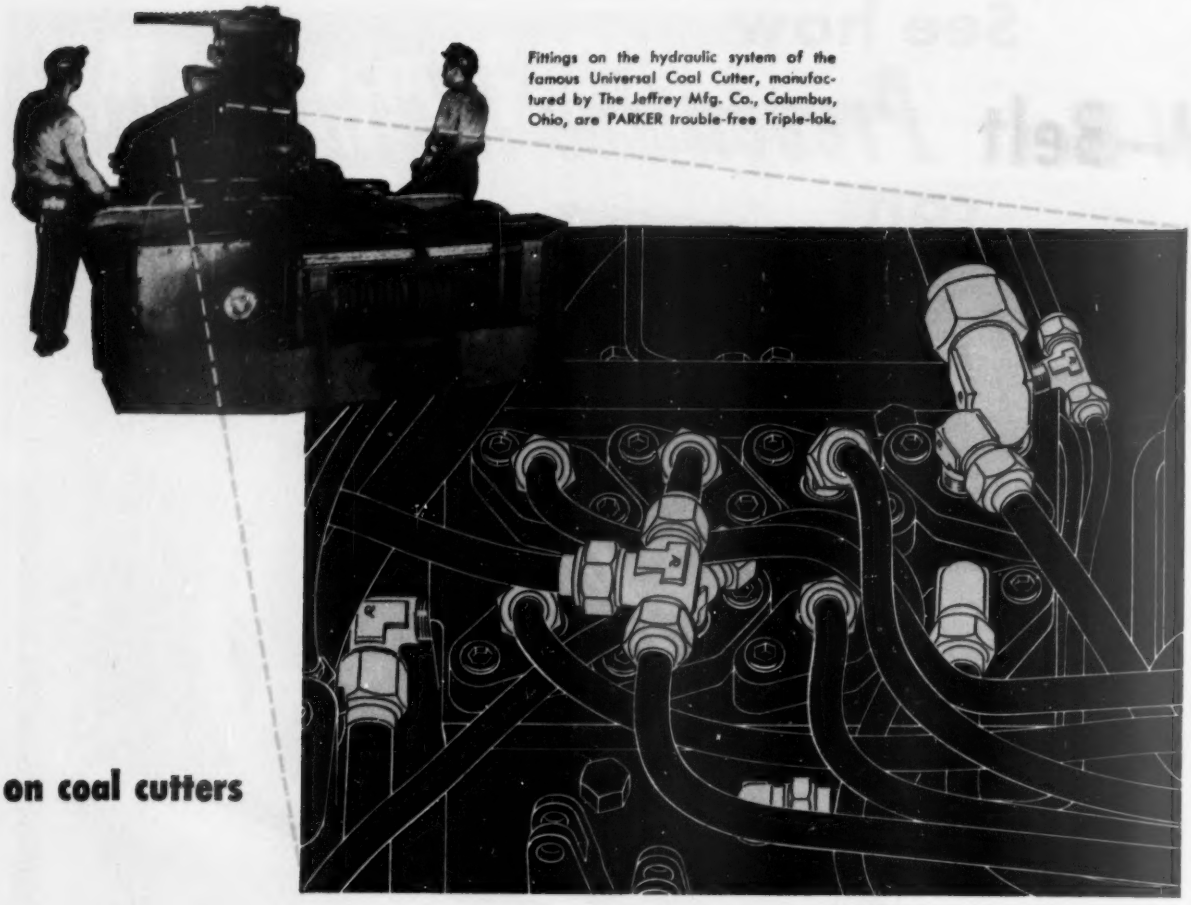

Fittings on the hydraulic system of the famous Universal Coal Cutter, manufactured by The Jeffrey Mfg. Co., Columbus, Ohio, are PARKER trouble-free Triple-lok.

on coal cutters

Tube it up...Forget it...WITH PARKER

TROUBLE-FREE TRIPLE-LOK FITTINGS

Few machines get rougher use than coal cutters in coal mines. Subjected to severe vibration, caused by the action of the cutting head, and operating under the most adverse conditions, all parts must be ruggedly built, including the hydraulic system.

You'll find Parker Triple-lok Fittings on coal cutters and many other machines used in rough, rugged service because they are leakproof under the severest conditions of vibration, elevated temperatures, high pressures and repeated assembly. Parker Fittings meet the specifications of the A.S.M.E. Code for Pressure Piping, as well as J.I.C. and S.A.E. standards.

So *tube it up* and *forget it* : : : with Parker Triple-lok Fittings. Ask your Parker Distributor for Tube Fitting Catalog 4300, or write The PARKER Appliance Company, 17325 Euclid Avenue, Cleveland 12, Ohio.

This does it

Triple-lok . . . 3-piece flare fitting famous for its sleeve . . . the easiest way to install tubing systems. Made in brass, steel, stainless steel, aluminum alloy.

Precision Mark of

Leakproof Tube Fittings

Parker

TUBE FITTINGS • VALVES • O-RINGS

Plants in Cleveland • Los Angeles • Eaton, Ohio • Berea, Ky.

Parker

INDUSTRIAL TUBE FITTING

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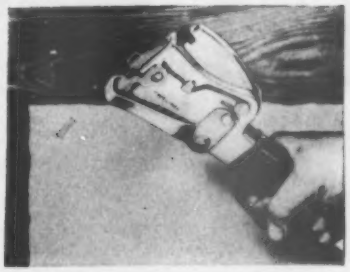
AKRON 9, O.—B. W. Rogers Co., 850 So. High St.
ARDMORE, Pa.—Louis H. Hein Co., 15 West Lancaster Ave.
BALTIMORE 13, Md.—Carey Machinery & Supply Co. 3501 Brehms Lane
BALTIMORE 5, Md.—Whitehead Metal Products Co. 4300 E. Monument St.
BEAUMONT, Tex.—Standard Brass & Mfg. Co., 705 Milam St.
BOSTON 15, Mass.—A. E. Borden Co., 176 Brookline Ave.
BRYSON CITY, N. C.—Wallace Co. of Carolina, P.O. Box 572
BUFFALO 7, N. Y.—Whitehead Metal Products Co. 2128 Elmwood Ave.
CAMBRIDGE 39, Mass.—Whitehead Metal Products Co. 281 Albany St.
CEDAR RAPIDS, Ia.—Globe Machinery & Supply Co. 309 8th Ave., S. E.
CHICAGO 14, Ill.—Wallace Tube Co., 1300 Diversey Pkwy.
CINCINNATI 29, O.—Williams & Co., 3231 Fredonia Ave.
CLEVELAND 14, O.—W. M. Pattison Supply Co. 777 Rockwell Ave.
CLEVELAND 15, O.—B. W. Rogers Co., 1900 Euclid Ave.
CLEVELAND 14, O.—Williams & Co., 3700 Perkins Ave.
COLUMBUS 8, O.—Williams & Co., 851 Williams Ave.
DALLAS 9, Tex.—Metal Goods Corp., 6211 Cedar Springs Rd.
DAVENPORT, Ia.—Globe Machinery & Supply Co. 410 East Second St.
DAYTON 10, O.—J. N. Fauver Co., 1534 Keystone Ave.
DENVER 2, Colo.—Metal Goods Corp., 2425 Walnut St.
DES MOINES 6, Ia.—Globe Machinery & Supply Co. East First & Court Ave.
DETROIT 1, Mich.—J. N. Fauver Co., 49 West Hancock St.
HARRISON, N. J.—Whitehead Metal Products Co. 1000 South Fourth Ave.
HOUSTON 3, Tex.—Metal Goods Corp., 711 Milby St.
HOUSTON 1, Tex.—Standard Brass & Mfg. Co. 2018 Franklin St.
INDIANAPOLIS 27, Ind.—Kerhumel Steel & Aluminum Co. 3562 Shelby St.
JACKSONVILLE, Fla.—Florida Metals Inc. 2937 Strickland St.
KANSAS CITY 16, Mo.—Metal Goods Corp., 1300 Burlington Ave., North Kansas City
KNOXVILLE 5, Tenn.—Leinart Engineering Co. 412 E. 5th Ave.
LOS ANGELES 4, Cal.—Haskel Engineering & Supply Co. 721 W. Broadway, Glendale
LOS ANGELES 12, Cal.—Metropolitan Supply Co. 353 East 2nd St.
MEMPHIS, Tenn.—J. E. Dilworth Co., 730 South Third St.
MILWAUKEE 3, Wis.—Morman Belting & Supply Co. 522 W. State St.
MILWAUKEE 4, Wis.—Wallace Cos. of Wisconsin 838 So. 6th St.
MINNEAPOLIS 15, Minn.—Vincent Brass & Copper Co. 124 Twelfth Ave., So.
NEW ORLEANS 12, La.—Metal Goods Corp., 432 Julia St.
NEWPORT NEWS, Va.—Noland Co., 27th St. & Virginia Ave.
NEW YORK 12, N. Y.—Nielsen Hydraulic Equipment, Inc. 298 Lafayette St.
NEW YORK 14, N. Y.—Whitehead Metal Products Co. 303 West 10th St.
PHILADELPHIA 40, Pa.—Whitehead Metal Products Co. 1955 Hunting Park Ave.
PITTSBURGH 33, Pa.—Williams & Co., 901 Pennsylvania Ave.
PORTLAND 10, Ore.—Hydraulic Power Equipment Co. 2316 N. W. Savier St.
ROANOKE 10, Va.—Noland Company, 11 Salem Ave.
ROCKFORD, Ill.—Rockford Tool & Transmission Co. 802 Broadway
SAN FRANCISCO 3, Cal.—General Machinery & Sup. Co. 1346 Folsom St.
SEATTLE 9, Wash.—Palmer Supply Co., 222 Westlake, N.
SHREVEPORT, La.—Standard Brass & Mfg. Co. 1557 Texas Ave.
ST. LOUIS 15, Mo.—Metal Goods Corp., 5239 Brown Ave.
SYRACUSE 4, N. Y.—Whitehead Metal Products Co. 207 W. Taylor St.
TOLEDO 2, O.—Williams & Co., 650 E. Woodruff Ave.
TULSA, Okla.—Ardun Supply Co., 317 S. Detroit
TULSA 3, Okla.—Metal Goods Corp., 302 North Boston
CANADA—Railway & Power Engineering Corp. Ltd.
EXPORT—Mercator Corp., 438 Walnut St., Reading, Pa.

NEW MAINTENANCE TOOLS & SUPPLIES

Begins on page 168



Stapling Hammer Uses Wide Staple

Here's a new stapling hammer using a staple twice as wide as that used by other medium-duty guns.

Designed for jobs where greater surface contact is needed, such as applying insulation batts, roofing paper, and freight car lining. For one hand operation. One blow drives the staple home even in hard wood, the maker says.

Bostitch, 1010 Mechanic St., Westerly, R. I.

■

Magnetic Clamps for Welding Work

Magnetic clamps locate and hold pieces of metal together for tacking and welding.

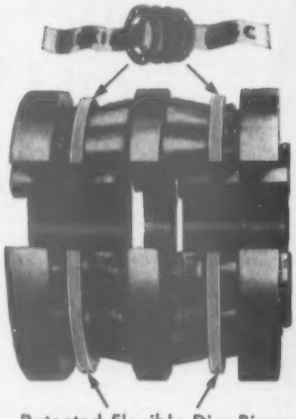
Several different models have been designed for various welding requirements.

Aronson Machine Co., Arcade, N. Y.

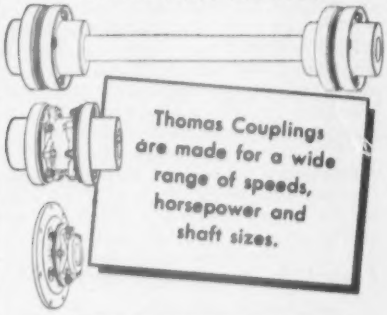
Turn the page

Specify THOMAS ALL METAL
FLEXIBLE COUPLINGS
for Power Transmission to avoid Costly Shut-Downs

DISTINCTIVE ADVANTAGES	
FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.



Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes.

THE THOMAS PRINCIPLE GUARANTEES PERFECT BALANCE UNDER ALL CONDITIONS OF MISALIGNMENT

NO MAINTENANCE PROBLEMS

ALL PARTS ARE SOLIDLY BOLTED TOGETHER

Write for our new Engineering Catalog No. 51

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.

with THE MULTI-CLEAN METHOD!"

"Keeping our floors sealed with Multi-Clean Concrete Preserver holds dust to a minimum throughout the plant and makes them easier to keep clean and sanitary," says the floor maintenance director of Griggs, Cooper and Company, large mid-western food processing firm.

"Daily sweeping time has been cut at least one-third because heavier dirt doesn't stick to the hard, smooth finish, and dust sweeps up easily. Moisture, too, is prevented from penetrating the floor surface, and makes it impervious to alkalies, grease, acids, etc.

"In our spice and baking powder rooms, dust is extremely fine and hard to sweep up. Here we use the Multi-Clean industrial vacuum which gives us an efficient and dust-free operation.

"We wet mop all our concrete floors once or twice a week and buff them once a month with a fine steel wool disc under a Multi-Clean floor machine to loosen any stubborn dirt and restore the finish. Multi-Clean Concrete Preserver is applied every 6 months to a year, depending on traffic conditions.

"With the Multi-Clean Method of floor care, our concrete floors are kept in better condition to stand the rigorous traffic they get every day. Then, too, they're always clean and attractive, and repairs and replacements are practically non-existent."

Multi-Clean Concrete Preserver

Multi-Clean Floor Machine

Multi-Clean Wet-Dry Vacuum

Every Multi-Clean product carries a 100% guarantee.

MULTI-CLEAN PRODUCTS, INC.

free! FLOOR MANUALS

Each for the proper care of a specific floor. Check the coupon for the manuals of your choice.

MULTI-CLEAN PRODUCTS, INC.
2277 Ford Parkway • Dept. FM-9 St. Paul 1, Minn.
Gentlemen—I would like to know more about the Multi-Clean Method for my floors. Send manuals I have checked.

☐ Asphalt Tile ☐ Concrete ☐ Rubber Tile
☐ Wood ☐ Terrazzo ☐ Linoleum
☐ 9-Job Floor Machine ☐ Wet-Dry Vacuum
☐ All-Purpose Scrubber

Name and Title_____
Company_____
Address_____
City_____ Zone_____ State_____

NEW MAINTENANCE TOOLS & SUPPLIES

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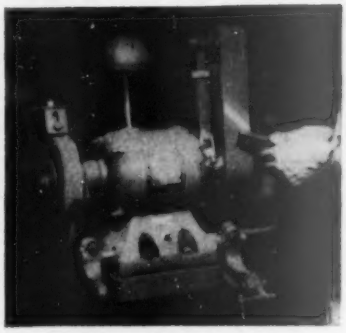


Easily Attached Portable Grinder

The Adapt-A-Belt is a portable grinder attachment that can be used for a variety of grinding and polishing operations.

Can be easily attached to an air outlet or clamped on lathes, milling machines, drill presses, or pedestal grinders to perform jobs that do not warrant setting up a machine.

It is of rigid lightweight steel construction. Models to handle 1-in. and 2-in. belts are available.

Curtis Machine Corp., Jamestown, N. Y.

■

ELECTRIC PAINT REMOVER that literally wipes old paint off any surface is being manufactured by the Ludlow Products Corp., 1416 Broadway, Schenectady 6, N. Y. Called Glo-Torch, it consists of a tubular metal-sheathed 1000-watt, 115-volt unit producing 1250 degrees of heat under a stainless steel reflector.

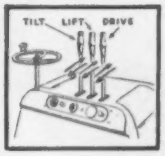
■

NON-CORROSIVE FLUX FOR ALUMINUM JOINING that lowers surface tension and provides improved wetability is being produced by the Eutectic Welding Alloys Corp., Flushing, N. Y. Because the flux is non-hygroscopic, it eliminates corrosion caused by water absorption from the atmosphere, the manufacturer says.

Turn the page

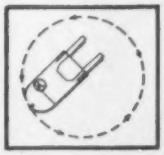
ONLY
MOBILIFT
STAND-UP FORK LIFT TRUCKS
Give You

Lev-R-Matic DRIVE



- No Gears to Shift
- Speeds All Movements

MOBILIFT MOBILITY



- 360° Steering—
  ZERO Inner Turning Radius
- Excels in Close Quarters

MOBILIFT STAND-UPS

- Ample Size Platform
- On and Off in Seconds
- All Around Visibility

Only MOBILIFT Stand-Up type Fork Lift Trucks give you Lev-R-Matic push-pull controls for forward-back, elevating, tilting...THERE ARE NO GEARS TO SHIFT!

Only MOBILIFTS give you MOBILIFT agility and quickness with their compact design, short overall length, 360° steering and ZERO inner turning radius. They excel in congested areas.

Only MOBILIFTS give you perfected Stand-Up models—for *more* work, *faster* work, *less* operating expenses.

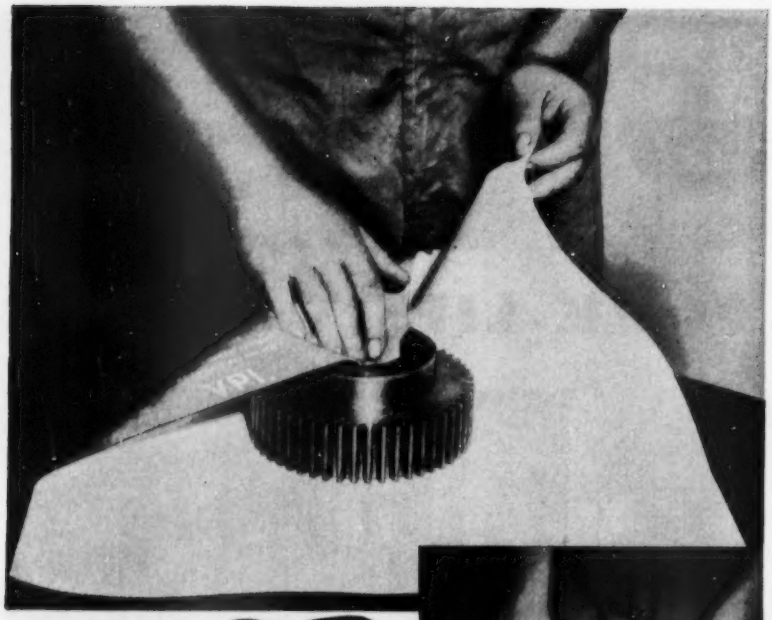
To these *plus* advantages add MOBILIFT air-cooled, 3-cylinder engine's reliable power and easy accessibility for minimum service and repair...the answer is obvious:

YOU'LL ACCOMPLISH MORE...WORK FASTER...
EARN MORE WITH MOBILIFT FORK LIFT TRUCKS

Write for complete information

MOBILIFT CORPORATION

MOBILIFT *Lev-R-Matic* **DRIVE**



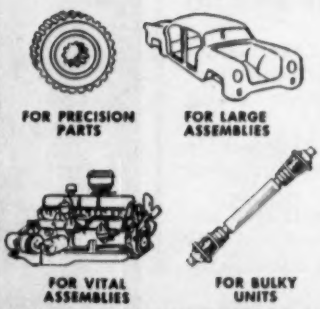
STOP RUST

ORCHARD VPI PAPER PREVENTS RUSTING ON ALL FERROUS METAL PARTS & PRODUCTS

ORCHARD VPI is economical, easy to use, convenient to handle. This famous Orchard product protects ferrous metals from rust for years by releasing a vapor, which forms an invisible film on the metal surface. Perfect for automotive parts, engines, tools, machinery as well as heavy equipment and small arms.

VPI is economical; it eliminates the need for greases, and oils, keeping the metal part ready for immediate use. ORCHARD VPI is available in rolls, sheets, bags or shrouds for use with any product.

Manufactured in accordance with Military Specifications MIL-P-3420 and MIL-V-8574



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3914 N. Union, St. Louis 15, Mo.
Send us complete details and samples of Orchard VPI, for use with our product .....

Name _____
Firm _____
Address _____
City & State _____

NEW MAINTENANCE TOOLS & SUPPLIES

Begins on page 168

Detector to Locate Underground Pipes

This portable 10-lb. electronic detector will help your plant engineer locate those old underground pipe lines.

It is of rugged and compact construction. A simplified circuit gives it great power of penetration and sensitivity, the manufacturer claims.

The Radiac Co., Inc., 489 Fifth Ave., New York 17.

■

Extractor for Broken Threaded Parts

Extracting tool removes broken threaded parts without wedging them in place. Made to work on any fitting in the hydraulic or mechanical field.

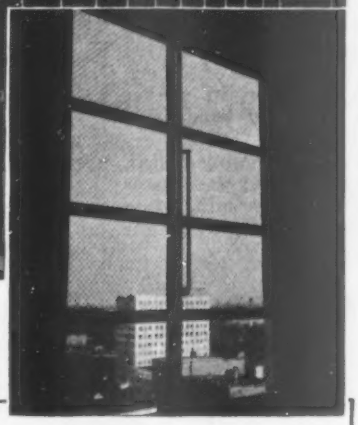
The extractor forms teeth inside the hole until the shoulder contacts the part and permits a high torque without expanding the part, the maker says.

Roddick Tool Co., 1023 N. Pauline St., Anaheim, Calif.

■

Drills Large Holes in Masonry Materials

A portable machine, called the Mole, will let your maintenance men drill up to 6-in. holes in concrete and masonry materials. Cut



Another modern building glazed with Mississippi Wire Glass. More than 6000 sq. ft. of Polished Misco are used in this outstanding Aid Association for Lutherans Building, Appleton, Wisconsin. Architects, Cram & Ferguson, Boston, Mass., & Maurey Lee Allen, Appleton, Wis.

Send for Catalog No. 53. Free samples on request.

Specify Mississippi Wire Glass . . . the original solid wire glass upon which the Underwriters' Standard was based . . . the standard today by which all others are judged. Available in either hexagonal or Misco wire mesh in types for clear vision or diffusion. Carried in stock by distributors of quality glass everywhere.

Trial by Fire!

Mississippi Wire Glass Standard of Safety For Over Half a Century

Wire glass is the only material for glazing openings that can successfully withstand the fury of the flames in this dramatic Underwriters' Laboratory test. To qualify as Fire Retardant No. 32, the glass is first subjected to temperatures ranging up to 1600 deg. F. and later to a ¾" stream from a fire hose at 35 to 40 lbs. pressure. Passing the test requires that the glass remain in the sash substantially unchanged except for cracking due to thermal shock.

With an enviable record of protecting life and property, Mississippi Wire Glass helps bottle up fire . . . often prevents it from roaring into tragic and costly conflagration. And this proven product more than meets Underwriters' requirements — it is the standard upon which those specifications were established in 1899.

Mississippi Wire Glass affords constant protection at minimum cost in vertical shafts, partitions, exterior walls, skylights, windows, doors, and all other vulnerable locations where fire or breakage protection is desirable. A non-combustible, it offers other exclusive features in its corrosion resistance, rigidity, absence of shrinkage and in glazing advantages that far outweigh a possible slight difference in initial cost.

MISSISSIPPI Glass COMPANY

88 ANGELICA ST. SAINT LOUIS 7, MO.

NEW YORK • CHICAGO • FULLERTON, CALIF.

WORLD'S LARGEST MANUFACTURER OF ROLLED, FIGURED AND WIRED GLASS

KELLER Air Tools

Increase Production per Man-Hour

ANOTHER EXAMPLE OF

KELLER *Air Tools engineered to industry*

Keller Screw Drivers and Nut Setters brought important benefits to a manufacturer of duplicating machines. He says: "Since we started using Keller air tools there has been a noticeable reduction in worker fatigue, and increased production per man-hour.

"Our work requires highly skilled, intelligent workers, and these tools have given them better satisfaction in their jobs, and improved our labor relations."

Weigh less

Consume less air

Reduce operator fatigue

Wide variety of handles, gearings, torques, speeds

FACTS IN BRIEF

ABOUT KELLER PNEUMATIC SCREW DRIVERS

Interchangeable parts

Need fewer "back-up" parts in the tool room

Clutches, socket drivers, 45° and 90° attachments for every purpose

Send for

FREE 36-Page Booklet

for more information and interesting ideas on air tool application

Keller Tool Company, Grand Haven, Mich.

Please send me a free copy of your booklet on Pneumatic Screw Driving and Nut Setting Tools

Name _____ Title _____

Company _____

Address _____

City _____ Zone _____ State _____

through steel reinforcing rods, too, says the maker.

Can be used effectively to run service lines, such as electrical conduits, water pipes, and plumbing, through floors. Simple to operate. Machine will drill vertical holes only.

Molco Drilling Machines, Inc., 1100-20th St. N.W., Washington, D. C.

■

Vise-Like Wrench With Velvet Touch

A pipe wrench with a vise-like grip that will not mar chrome or other types of pipe is now available.

Can handle pipe sizes from ½ to 1¼ inches. Jaws will hold hex inserts to tighten nuts and bolts.

Once tightened wrench will not slip on the pipe. No change in grip is required for tightening or loosening threads.

Robert Austin Corp., 51 Albany St., Boston.

■

Maintenance Tool for Carbide Dies

Is the repair and alteration of tungsten carbide dies one of your problems? The Di-Profiler will take care of this, the maker claims.

The action of this tool is reciprocating and oscillating. When used with a spindle attachment a finely controlled rotary action also is obtained.

Nord International Corp., PO Box 44-N47, Denville, N. J.

■

FOR GRINDING CEMENTED CARBIDE TOOLS a grinding wheel called MM has been developed by the Macklin Co., Jackson, Michigan. Grinding time can be reduced as much as 50% and wheel life increased as much as 300% by the improved construction of this tool.

Turn the page

For top maintenance—depend on "U. S." Tape!

FRICTION, RUBBER and PLASTIC

SECURITY® FRICTION TAPE

For electrical and general purpose jobs. This is the strong, tacky tape that really grips and stays on. The fabric has unusually high tensile strength to handle tough jobs. Straight-tearing, non-ravelling. No pinholes to cause leaks. Rely on Security to stay on. Available also in specification grade—U.S. Holdtite®—exceeds A.S.T.M. specifications.

SECURITY RUBBER TAPE

For all general electrical work. This unvulcanized rubber splicing compound has the necessary physical properties: tensile strength, elongation, tackiness, plus the dielectric strength needed for durable splices. It is easy to handle and will fuse into a solid mass without heat or undue pressure. Available also in a specification grade—U.S. Holdtite—exceeds A.S.T.M. specifications.

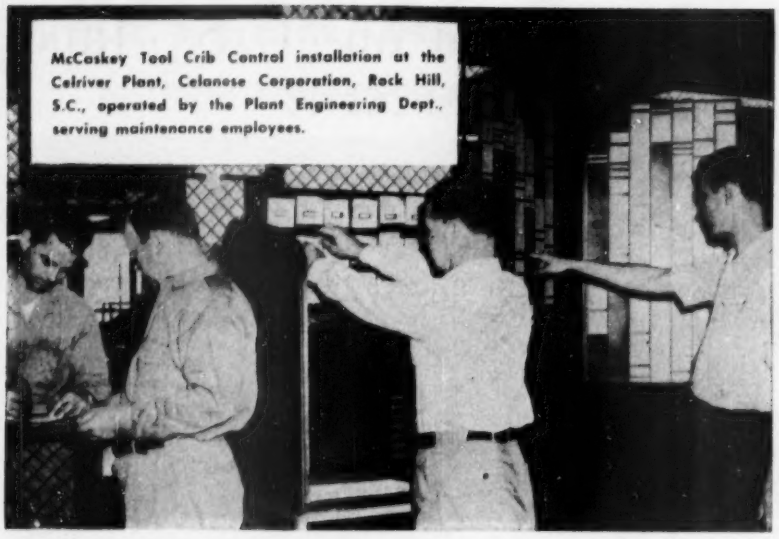
ROYALASTIC PLASTIC TAPE

Does the work of both rubber and friction tape in many uses. This is the tape many maintenance men find best for making a thin splice and keeping wiring neat and uncluttered. Complete mechanical and electrical protection. High tensile strength and excellent resistance to abrasion and to water, oils, acids, alkalies and corrosive chemicals. Good stretch . . . clings tightly . . . strips cleanly.

United States Rubber Company is a single source for industrial tape. Simplify your purchasing by using one line. See your distributor or contact any one of our 25 District Sales Offices.

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.



McCaskey Tool Crib Control installation at the Celriver Plant, Celanese Corporation, Rock Hill, S.C., operated by the Plant Engineering Dept., serving maintenance employees.

Celanese Corporation of America Employees and Management approve McCASKEY TOOL CONTROL

"Provides better labor relations . . . reduced tool purchases", to quote Mr. B. A. Morgan, Jr., Maintenance Engineer. Here's his complete report:

"We installed McCaskey Tool Crib Control at the beginning of plant operations and have found that our tool loss has shown a continued downward trend.

"The employee likes this system much more than older methods such as 'picking up brass', etc. It is a positive means of his protection against mistaken charges, as his signature and ticket number must match up with both his receipt and that of the Tool Crib Attendant's.

"The Company likes it because it speeds up operations; makes for better labor relations; and is practically fool-proof. We can locate a loaned tool almost instantly and thus save duplicate purchases of many expensive items."

Let us send proof of substantial savings in both large and small plants . . . or have a qualified representative explain how McCaskey Control will improve your operations.

MAIL COUPON FOR FURTHER DETAILS

THE McCASKEY REGISTER CO.
ALLIANCE, OHIO

Please send me all the facts concerning McCaskey Tool Control. No obligation is incurred on my part.

Name .....

Position .....

Company .....

Address .....

FMM-9-53

McCaskey
INDUSTRIAL CONTROLS
PRODUCTION • INVENTORY
TOOLS • COSTS • PAYROLL
THE McCASKEY REGISTER CO.
ALLIANCE, OHIO
McCaskey Systems, Ltd., Galt, Canada
The McCaskey Register Co., Watford, England

NEW MAINTENANCE TOOLS & SUPPLIES

Begins on page 168

Air-Powered Circular Saw

A portable circular saw that cuts maximum depth of 4 3/8 inches is air-powered. It is designed for use on 90 psi. air pressure.

Simple hand screw and thumb screw adjustments regulate the depth and angle of cut. The saw was built for maximum safety, the maker claims.

The 12-in. blade can be easily changed. A complete set of blades for cutting various materials is available. Metal carrying case houses and protects the saw.

Ingersoll-Rand Co., 11 Broadway, New York 4.

■

GASKETING MATERIAL equally effective at high and low temperatures has been developed by the Joclin Manufacturing Co., 2964 Whitney Ave., Hamden, Conn. Fluorlastic is made of Teflon and silicone rubber, and looks like weather stripping. It is recommended for use in the chemical, pharmaceutical, and aircraft industries.

■

HIGH SPEED AND POWER PORTABLE 7-IN. ELECTRIC SAW weighing 12 1/2 pounds is available from the Porter-Cable Machine Co., Syracuse, N. Y. Will cut full 2-in. stock at 90 degrees and will bevel-cut 2-in. dressed lumber at a 45-deg. angle. Has a telescoping guard designed to move into the cut with "drag."

■

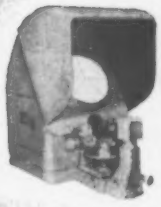
RESIMENT, A RESIN CEMENT, is resistant to alkalis, acids, solvents, hot water, and steam. Manufactured by the Delrac Corp., Watertown, N. Y. Can be used as mortar for acid brick and tile in corrosion-resistant tank linings, floors, sewers, towers, and similar installations. Will set in either summer or winter.

Turn the page

11 MODELS

3 SCREEN SIZES

Pedestal Type
14" Diam. Screen



Bench Type
14" Diam. Screen
4 Models

Bench Type
5¾" x 7¾" Screen
3 Models

Unsurpassed Inspection Versatility

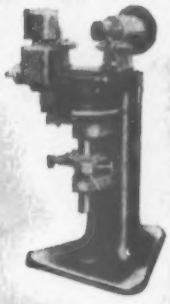
JONES & LAMSON OPTICAL COMPARATORS

The Essence of Quality Control

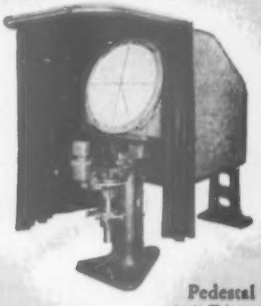
Jones & Lamson Optical Comparators are designed and built like rugged machine tools to withstand vibration and hard use. Yet they have the built-in accuracy to satisfy the most exacting laboratory standards.

- **They meet** the requirements of toolroom, laboratory and production inspection.
- **They precisely measure** height, depth, lead or spacing, as well as angles to degrees and minutes. They will measure to .0001".
- **They compare** intricately contoured parts with a master outline—and measure the amount of error.
- **They are convenient** to operate, easy to set up and read direct—*without computation.*
- **They operate** under normal lighting conditions. *No darkroom is needed.*
- **They will photograph** the enlarged shadow and record its relationship to a master chart.
- **Several persons** may study the shadow *at the same time.*
- **They will inspect** and measure surface contours, as well as profiles of objects such as type faces, stamping dies, punches, worn tools, etc.

Vertical Type
14" Diam. Screen



Direct
Projection
Type



Pedestal Type
30" Diam. Screen

P.S. A complete line of STANDARD CHARTS and FIXTURES is maintained by us.

JONES & LAMSON

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE COMPANY
505 Clinton St., Springfield, Vt., U.S.A.

J&L COMPARATOR DIV.
Dept. 710

Jones & Lamson Machine Company
505 Clinton Street, Dept. 710
Springfield, Vermont, U. S. A.
Please send Comparator Catalog No. 402.

NAME _____ TITLE _____

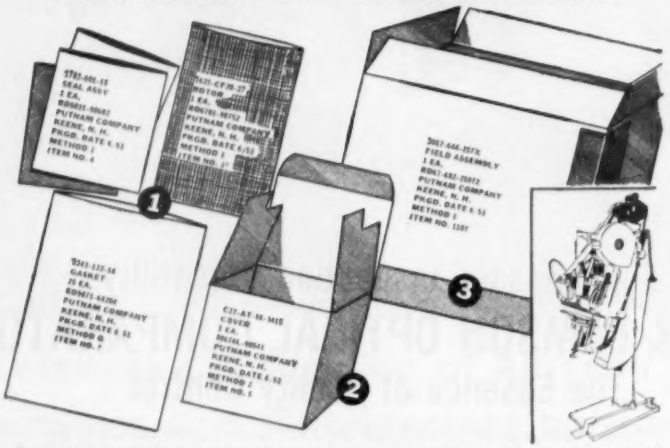
COMPANY _____

STREET _____

CITY _____ STATE _____

MARKEM SOLVED THIS MARKING PROBLEM

IDENTIFICATION MARKING
FOR CONTRACT AND OVERSEAS PACKING



In contract and export packing of parts, assemblies, etc., certain JAN specifications call for three packaging stages: (1) enclosure in scrimback or polyethylene lined *heat sealing* envelope, (2) intermediate packing in a folding box, (3) final packing in corrugated carton. Each of these three types of containers must be marked for instant and *permanent* identification. Many manufacturers, dissatisfied with conventional marking with crayon, stencil, labeling or other form of hand stamping, have not only found great savings in time and money, but also obtained more legible, longer lasting identification using a Markem Method. *One* Markem machine (with appropriate Markem type and Markem ink) prints desired information on *all three* containers. The vapor barrier of the envelope is not broken. Desired information is changed rapidly. By printing quantities of containers as and when needed, inventory problems are minimized. In this way, the Markem Method insures *positive identification* when the items reach their destination.

MARKEM MARKS THEM ALL

CAN MARKEM HELP YOU? Identification printing for contract and overseas packaging is but an example of how Markem solves industry's marking problems. Markem has been providing industry with production techniques and equipment to identify, decorate or designate its products, parts and packages since 1911. Markem also provides technically trained men who are available in your area to assure *continued* satisfaction with Markem methods and equipment.

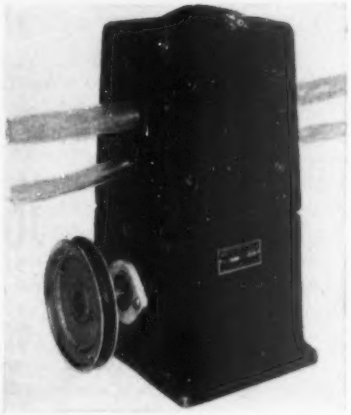
When *you* have a marking problem, tell us about it and send a sample of the item to be marked. Perhaps a complete Markem Method has already been developed to solve your problem. If not, Markem will work out a practical solution.

Markem Machine Company, Keene 18, N. H., U.S.A.

MARKEM ...TO MAKE YOUR MARK

WHAT'S NEW IN EQUIPMENT
Begins on page 166

AUXILIARY EQUIPMENT



Pump Handles Acids, Abrasives

Here's a pump for handling corrosive acids and abrasives. It can pump several liquids proportionally, simultaneously, and independently.

The pumping action comes from a series of chrome-plated fingers that exert pressure on a flexible tubing. The liquids being pumped never contact the pump itself.

To hook up, just place the tubing in the pump. Available in capacities from 45 to 250 gph. at 500 rpm.

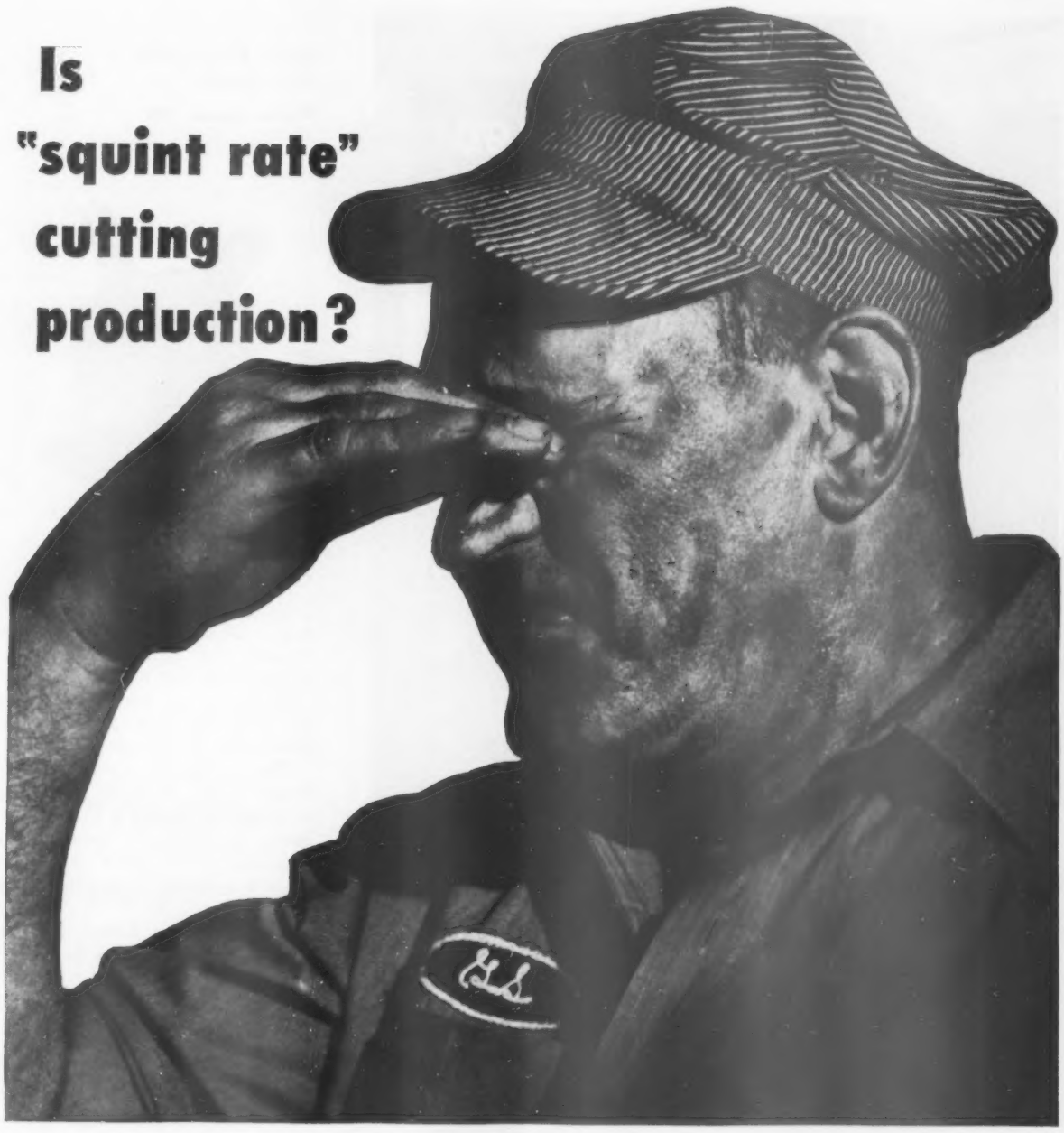
Sigmamotor, Inc., 527 N. Main St., Middleport, N. Y.

■

A BOILER-BURNER UNIT for high and low pressure steam and hot-water heating has been announced jointly by the Ray Oil Burner Co., San Francisco, and the Kewanee-Ross Corp., Kewanee, Ill. Has good efficiency in all firing ranges with heavy catalytic residual fuel oils as well as with light oils and high or low pressure gases, the makers say.

Turn the page

Is "squint rate" cutting production?



If, occasionally, a man in your plant stops his work, squints, rubs his eyes—that could be defective eyesight.

But, if man after man is showing this tell-tale sign of faulty vision — there's something else wrong. And it's an odds-on bet that the cause is bad lighting.

Inadequate or glare-ridden plant lighting, or both, can't help but eat into your people's efficiency and cut production. The very first requisite of a good man, no matter how skilled, is that he be able to see what he's doing, easily, comfortably, without strain.

Poor plant lighting is unfortunate, too, because the difference in first cost between a good and bad installation is surprisingly little. And the healthy upsurge of production you get with good lighting returns many times over that small difference in cost.

Check the "squint rate" in your plant. Isn't it time to call a halt on lighting that's *costing you money?* Isn't it time to change to lighting that *helps production?* Write for information about Day-Brite's CFI DAY-LINE® industrial fixtures—called CFI because they're designed and built to guarantee COMFORT FOR INDUSTRY.

"DECIDEDLY BETTER"
DAY-BRITE
Lighting Fixtures

Day-Brite Lighting, Inc., 5441 Bulwer Ave., St. Louis 7, Mo. In Canada: Amalgamated Electric Corp., Ltd., Toronto 6, Ontario. 348

saves labor – speeds handling

AT PLANT OF NATIONALLY-KNOWN PRECISION MANUFACTURER*

In this successful cost-saving application of the versatile STAK-RAK Crane, bar stock or long tubular shapes are removed from the trucks to the forks of the crane and placed directly in pigeon hole racks or fabricated Christmas tree type racks by single operator push button control. Column can be telescoped or equipped with cab so operator can ride with the load to service the top of the racks.

STAK-RAK Cranes utilize the maximum area of the cube, reduce aisle area to a minimum and still provide perfect maneuverability. STAK-RAK is a top running or under running crane which rotates a full 360 degrees to serve both sides of the aisle and provide 100 per cent selectivity in placing and removing loads. There are no operations on floors and therefore no floor maintenance and no floor load. Its applications cover an exceedingly wide range of materials handling and storage space problems and it is readily engineered to fit your individual requirements.

Chicago Tramrail Corporation manufactures a complete line of material handling equipment including underhung and overhung cranes, monorail systems, jib cranes and storage racks. Detailed information gladly supplied upon request.

*Name upon request.

INVESTIGATE NOW
Write for Catalog, Application Folder and Engineering Data.

CHICAGO TRAMRAIL CORPORATION
4004 WEST WASHINGTON BOULEVARD • CHICAGO 24, ILLINOIS

NEW AUXILIARY EQUIPMENT

Begins on page 182

Pump Has Hard Rubber Body Block

Using a Buna-N hard rubber body block, the PXHR Series pumps will withstand temperatures up to 225 F.

Design of this pump eliminates the need for stuffing boxes and shaft seals of any sort.

The pump can handle hydrochloric acid, hydrofluoric acid, sulphuric acid, and other highly corrosive chemicals. Available in capacities from 1/3 to 20 gpm., with a pressure range up to 60 psi.

Vanton Pump Corp., Empire State Bldg., New York 1.

■

Lever-Operated Time Delay Switch

Agaswitch is for use where a mechanically or manually initiated time-delay switch is required.

This lever-operated switch has a time delay period from 0.1 second to 5 minutes. The time delay is obtained by restricting the air flow through an adjustable orifice in the timing head.

The timing chamber is enclosed and dustproof. Air used for timing is recirculated inside. Comes in single-pole double-break, and double-pole single-break models.

Elastic Stop Nut Corp. of America, Elizabeth, N. J.

Turn the page

IT'S JUST THAT SIMPLE. There's only one reason in the world why so many materials handling men prefer Roebling wire rope and slings... *they cost a lot less on the job than any others.*

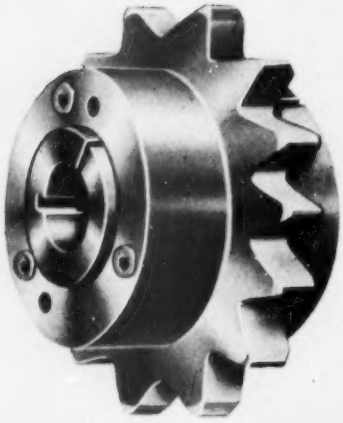
For top efficiency and economy, call your nearest Roebling office for a Field Man. He'll suggest the best ropes and Flatweave and All-Purpose Slings for your work.

ROEBLING CF&I

A subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, N. J.

this is the ticket . . .

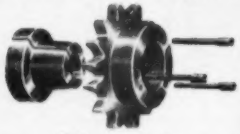


FORT WORTH

"QD" Roller Chain

SPROCKETS

WITH TAPERED - SPLIT INTERCHANGEABLE HUBS



Have The Advantage of One Hub for Both Sprockets & Sheaves

Fort Worth originated the tapered split hub sprocket to make the convenience and advantages of the "QD" assembly available to Roller Chain Sprocket users as well as V-Belt Sheave users.

Write for copy of "QD" Sprocket Catalog Section 300

FORT WORTH
STEEL & MACHINERY CO
DEPT. 69, 3600 McCART, FORT WORTH, TEXAS
— Factory Warehouses —
• CHICAGO • MEMPHIS • ST. LOUIS • ATLANTA
• HOUSTON • LOS ANGELES • SAN FRANCISCO
• KANSAS CITY • JERSEY

NO REBORING
Hubs are factory bored with keyway and set screw.

EASY ON -
Hub is fixed on shaft FIRST. Sprocket follows for ease of alignment.

EASY OFF -
Pull-up bolts in threaded holes in sprocket act as jackscrews. No hub pullers necessary. No damaged shafts.

SAVES ON Replacements
New sprocket can be used on old hub which reduces cost of replacement sprocket.

SIMPLIFIES Speed Changes
Many sprockets use same hub; therefore, speed changes are quickly and easily made at a saving in price.

Distributor Service
Both sprocket and hub are available "off the shelf" from industrial distributors without delay for alterations.

FITS SHAFT BETTER
Tapered split hub actually grips shaft for a positive press fit.

Fits Undersized SHAFT
Tolerances allow for press fit on shaft .005" undersized.

Reduces Cost of Spares
Relatively few sprockets and hubs can be carried as spares to prevent costly shutdown time with minimum inventory.

LOWER INITIAL COST
QD sprockets with hub COST LESS than conventional sprocket, ready to go on the shaft.

NEW AUXILIARY EQUIPMENT

Begins on page 182

Gas-Fired Burner Heats Wide Area

For oven-heating, kettle-heating and air-heating installations, here's a gas-fired, retention-type line burner.

It distributes heat over a wide area with a continuous flame. The burner can be installed to fire in any direction.

Drilled and matched flanges of the burner sections permit bolting together to form a variety of continuous flame patterns.

Eclipse Fuel Engineering Co., Rockford, Ill.

■

Variable-Speed Drive Clutch

The Hysteresis Magnetic Clutch is designed to improve performance of motor-driven machine tools and conveyors.

The clutch provides full torque at all speeds and stepless speed variations up to full motor output.

Also has full overload protection and is capable of 100% slip without appreciable heating.

Available in sizes from 1½ to 20 hp. for use in both motor-drive units in one housing and transmission-type units with separate motors.

June & Co., 505 New Center Bldg., Detroit 2.

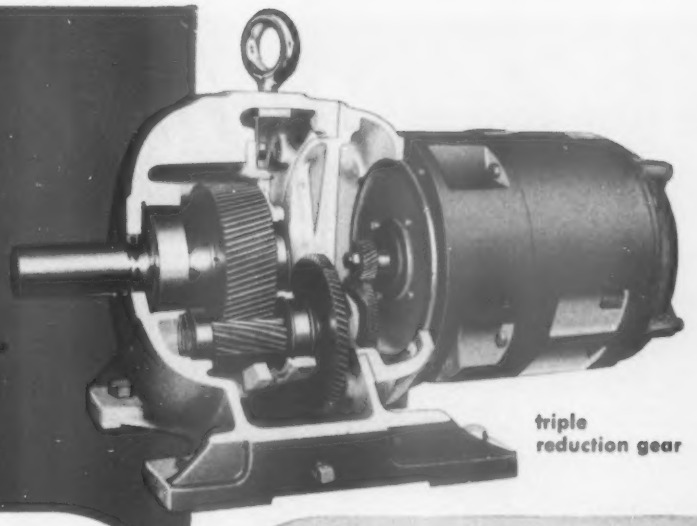
■

PRESSURE REDUCING REGULATOR for air and oxygen systems, smaller and lighter than comparable regulators, is now available. Manufactured by the Aro Equipment Corp., Bryan, Ohio. It takes inlet pressures up to 2000 psi., has adjustable output from 50 to 300 psi., and handles flows up to 300 liters per minute.

Turn the page

Now...

Simplify Your Motor Drives... and Save!



triple reduction gear

Here's

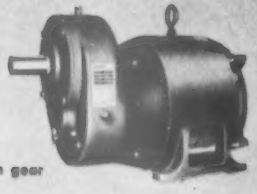
BUILT-IN SPEED... To Fit Your Need

with a complete, new line of

Century

Gearmotors

equipped with *Duti-Rated* Precision Gearing



Single reduction gear

Double reduction gear

Triple reduction gear

Now you can profit by the advantages of more compact, safer and simpler motor power transmissions... with rugged Century GEARMOTORS to match the operating speed of your equipment.

This new Century line offers a wider-than-ever choice of:

- **BUILT-IN SPEEDS**
- **MOTOR OPERATING CHARACTERISTICS**
- **FRAME PROTECTION**
- **HORSEPOWER RATINGS**... 1 to 15 h.p. with Duti-Rated Precision Gearing... and fractional gearmotors from ⅛ to ¾ h.p. are also available. Larger ratings can be furnished if required.

Century C MOTORS

CENTURY ELECTRIC COMPANY
1806 Pine Street, St. Louis 3, Mo.
Offices and Stockpoints in Principal Cities

820

FOR COMPLETE INFORMATION...mail this coupon today:

CENTURY ELECTRIC CO.
1806 Pine Street, St. Louis 3, Mo.

Please send Bulletin

☐ Bulletin 4-1p21 ⅛ to ¾ H.P.

☐ Bulletin 4-1p31 1 to 15 H.P.

To:

Name ..... Title .....

Company .....

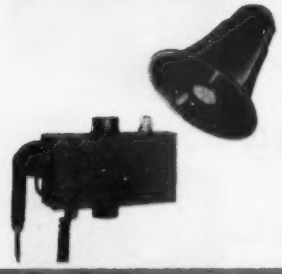
Address .....

City ..... Zone ..... State .....

FOR YOUR VOICE OF ACTION

Femco

AUDIOPHONES
provide low cost
COMMUNICATION
ANYWHERE IN INDUSTRY



Efficiency is improved—production goes up, when Femco equipment is installed. You talk from control points to plant and between plant operations. As many mike-speaker stations as you need.

Other Femco Products of Merit include:

Femco PAGEPHONES

Flexible inter-com and page systems

Femco PORTAPHONES

Movable as your work progresses

- Femco Communication Systems GET THINGS DONE faster - better - cheaper!
- Easy to BUY or LEASE Easy to INSTALL and USE
- DEMONSTRATIONS ARRANGED

FARMERS ENGINEERING & MANUFACTURING COMPANY
IRWIN, PENNSYLVANIA

Ask for YOUR Femco Data Kit

Specialists in Electronic Communication and Control

WHAT'S NEW IN EQUIPMENT
Begins on page 166

ELECTRICAL EQUIPMENT

Communications System Links Base With Cranes

The Telecrane FM Carrier Communications System provides 2-way voice contact between base stations and mobile units such as cranes and yard locomotives.

Designed to help coordinate operations, speed production, reduce delays, and promote safety in materials handling.

Free from transmission noise and interference, it is audible above the noise level of operations. Existing electrical circuits can be used for transmitting the carrier waves.

Mine Safety Appliances Co., Braddock, Thomas and Meade Sts., Pittsburgh 8.

■

Transformers Designed for Switchgear Use

Transformers for companies wishing to make their accessory equipment are available in sizes from 100 to 3000 kva. and voltages to 15,000.

Cores and coils have Class B and Class C heat-proof insulation.

Marcus Transformer Co., Montgomery St., Hillside, N. J.

Turn the page

900-ft. Link-Belt TRUCK-TOW speeds freight car loading...

In this operation, TRUCK-TOW handles as many as seven assorted products from packers and any number of floor stock varieties to loading platform. The 400-ft. rail loading dock is efficiently supplied from 43 loading stations. System operates 24 hours a day, six days a week.

FLOOR TYPE TRUCK-TOW CONVEYOR OFFERS ADVANCED-DESIGN FEATURES

Especially popular where overhead structures interfere with fork-lift truck operation is the Floor-Type TRUCK-TOW. All moving parts are located below the floor.

Also eliminates 80% of manual trucking at General Mills' Kansas City mill

WHEN General Mills planned on coordinating movement of products from packaging to loading at their Kansas City mill, they consulted Link-Belt. The result: a 900-ft. TRUCK-TOW Conveyor that pulls detachable hand trucks, speeds loading of up to seven individual products.

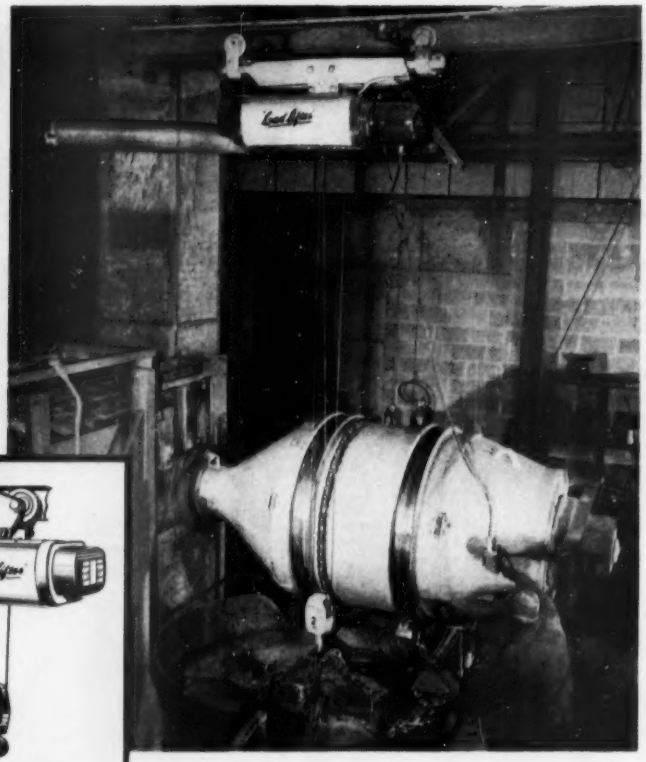
In three years' operation, there has never been a production stoppage due to conveyor failure. Working conditions are improved . . . capacity increased . . . manual trucking reduced 80%. Such efficiency and versatility typify TRUCK-TOW applications throughout industry. Both overhead and under-the-floor types have proved their ability to increase handling capacity . . . reduce handling cost.

A call to your nearest Link-Belt office can lead the way to smoother, more efficient movement of materials in your plant. Our engineers will be glad to show you how TRUCK-TOW can save time and money for you.

LINK-BELT

TRUCK-TOW CONVEYORS 13.201

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities.



EASY DOES IT!

'Load Lifter' SPEEDS TOUGH HANDLING

THE "SERIES 700" 'LOAD LIFTER' HOIST is the one electric hoist you can depend on for continuous service to keep defense and civilian production on the move. It's a heavy-duty hoist, built for 3-shift lifting every day in the year.

IT'S FAST AND ECONOMICAL — Shortens handling time — lifts a ton 30 feet a minute. Costs go down when the 'Load Lifter' does all the heavy work.

IT'S TOUGH AND SAFE — The 'Load Lifter' has every feature to safeguard man, load and hoist. Only 24 volts at the push button. Powerful motor and load brakes that act simultaneously. Steel suspension. No exposed wiring. Over-capacity load hook.

IT'S BUILT TO LAST — Heat-treated helical gearing provides greater strength. Ball bearings throughout minimize frictional wear. The 'Load Lifter' is constructed with few parts to assure trouble-free service.

SAVE IN YOUR PLANT — Wipe out muscle strain and maintain worker efficiency. Give your production a lift at the same time. 'Load Lifter' capacities range from ½ ton up. Ask your "Shaw-Box" Distributor for details or write for Bulletin 399.

'Load Lifter'® ELECTRIC HOISTS

MANNING, MAXWELL & MOORE, INC.
MUSKEGON, MICHIGAN

Builders of "Shaw-Box" and 'Load Lifter' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, and 'American' Industrial Instruments.

NEW ELECTRICAL EQUIPMENT

Begins on page 188

Plug Gets Power From Busway Easier

Here's a plug that will make it easier to get power from busways to machines below. It is called Flex-A-Plug.

Hanger clips make installation easier and faster. These clips hold the plug in position while screws are tightened to anchor it firmly to the busway. Installation can be made in one-quarter of the previous time required, the maker claims.

Trumbull Electric Dept., General Electric Co., Plainville, Conn.

■

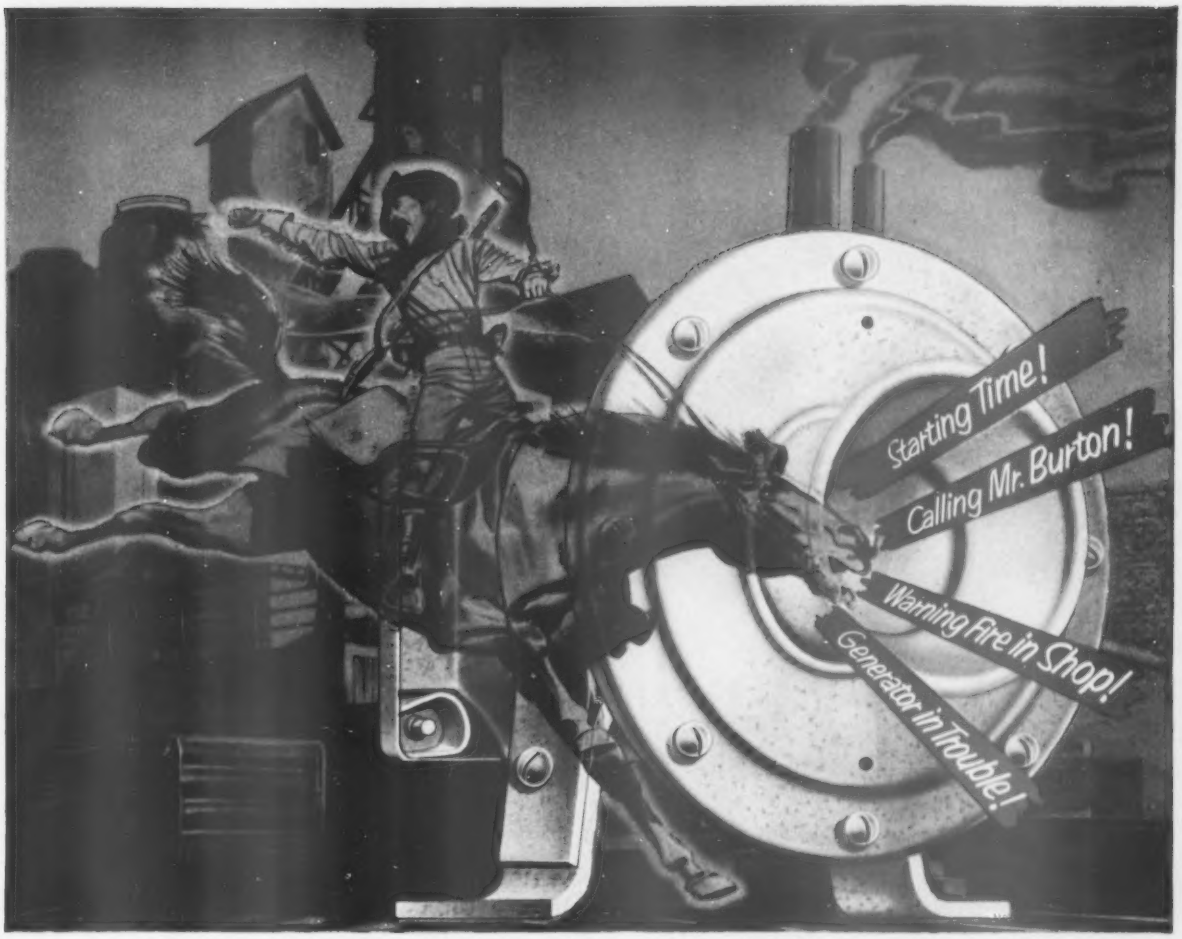
Duct Features "Lay-in" Wiring

This duct eliminates the need for threading and pulling conductors through duct. The hinged design permits wiring to be laid in place.

"Lay-In" Duct is made in several sizes. A 2-piece hanger is available for mounting the duct.

Square D Co., 6060 Rivard St., Detroit 11.

Turn the page



"The 20th Century Pony Express"

sounds the ALARM against these enemies:

slowed-up production! stalled machines! fire! explosion! sabotage!

To rescue your plant from these production enemies, come Benjamin Sound Signals... the latest type of Horns, Buzzers and Sirens... products of more than a half-century experience and a most advanced sound laboratory.

Plants of every size are finding new uses for these Benjamin Sound Signals that save time, machines and money:— cutting hidden costs... scheduling production cycles... equipping machines to call for help as soon as they are disabled... protecting the entire plant more completely against dangers within and without.

Have you considered your sound signal needs lately in the light of expansions... new methods and changing conditions?

Whether you want to improve signal equipment in only one or two departments or are thinking of a complete plant signal system, Benjamin Signal Engineers will be glad to give you the benefit of their many years' experience.

Send for the new, *free* Benjamin Signal Book... latest, most complete book on Industrial Signals ever published. Tells how to measure your signal needs; gives essential facts about sound and principal factors in choosing equipment, shows full line of all types of Benjamin Signals, with specifications and technical data; explains why Benjamin Signals have a distinctive, dominating sound that cuts through surrounding noises. *Your FREE Copy is ready for you.* Write today. Benjamin Electric Mfg. Co., Dept. N. Des Plaines, Ill.

am

for Signal Success Specify **BENJAMIN Sound Signals**

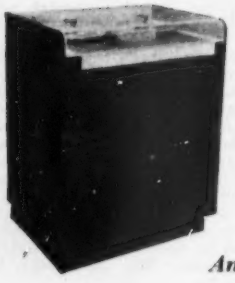
A Product of the Benjamin Electric Mfg. Co., makers of famous Benjamin and Leader Line lighting equipment and sound signals, for Industry, Institutions and Commerce.

What they're hearing

is improving their production

When you reduce boredom and fatigue, production per man goes way up. That's why progressive managements everywhere are installing background music in factories, laboratories, offices and stores.

Background music now costs less than ever before. The new AMPEX 450 Continuous Tape Reproducer plays on your premises — yet requires no standby operator. There is up to 8 hours of programmed music on each tape. (Pre-Recorded tapes are available through AMPEX distributors.)



Through higher production AMPEX background music will earn a place in your business. For further information, write Dept. Y-1338B

Ampex 450 Continuous Tape Reproducer

Plays up to 8 hours unrepeated program without attention from an operator; adaptable to music, speech or sound of any kind.

AMPEX
ELECTRIC CORPORATION | 934 CHARTER STREET • REDWOOD CITY, CALIFORNIA

NEW ELECTRICAL EQUIPMENT

Begins on page 188

Intercom Screens out Hum and Noise

This 2-station intercommunications system requires no wired installation. Plug it into the electrical outlet and you have a noise-free communications set-up.

Designed for instant and temporary installation. The Talk-A-Phone system can have additional stations added to it at any time. All stations can receive messages transmitted from any point, manufacturer adds.

Talk-A-Phone Co., 1512 S. Pulaski Rd., Chicago.

■

Rectifier Unit for Small D-C Machinery

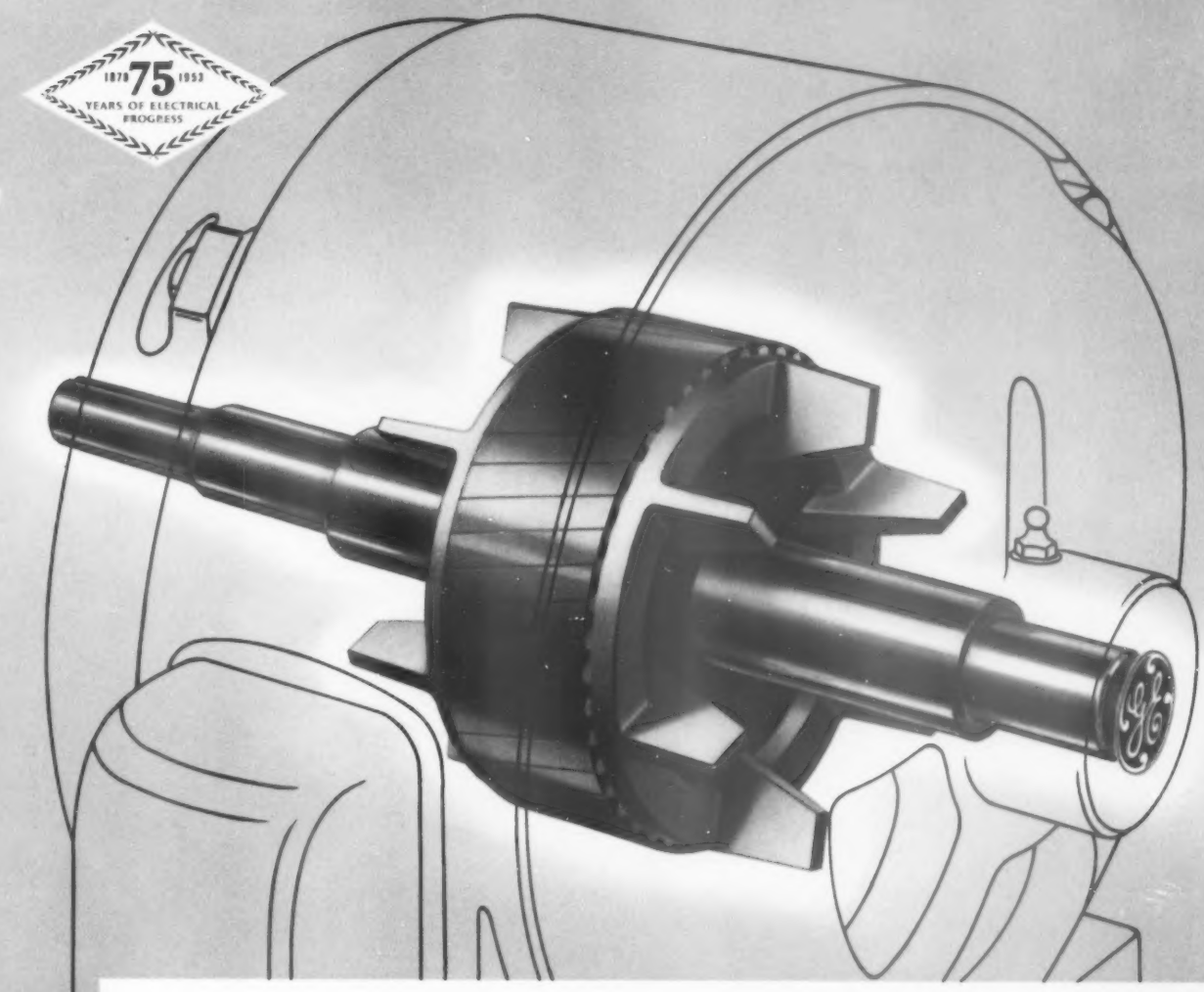
Here's a small self-contained rectifier that provides a d-c source direc.ly from a-c. Just plug it into the a-c outlet.

The My-T-Midget Rectifier is designed especially for use with small d-c-operated machinery. The unit employs selenium cells for its converting action.

D-c output is 110 or 220 volts. Available in sizes from 1 to 8.5 amperes.

American Rectifier Corp., 95 Lafayette St., New York 13.

1879 75 1953
YEARS OF ELECTRICAL PROGRESS



Why rotors don't fail in G-E TRI-CLAD motors

REG U.S. PAT. OFF.

G-E pioneering and research developed and produced this one piece cast-aluminum rotor winding, which has virtually eliminated rotor failures in Tri-Clad motors.

Rotor is indestructible in service because the bars, end rings, and fans are a "one-piece" casting. No brazed joints, no fabricated fans to come apart.

Rotor inertia is reduced by the lightness of the aluminum, thus raising efficiency and allowing easier starting, stopping and reversing.

Rotor efficiency is higher, operating losses reduced, as the result of a special chemical treatment.

The motor runs cooler because the integrally cast fans dissipate heat faster.

Operation is smooth and quiet due to the dynamic balancing of the rotor which also reduces bearing wear and material fatigue.

Long rotor life is one more reason why G-E Tri-Clad motors last longer — give you more reliable service and greater operating economy.

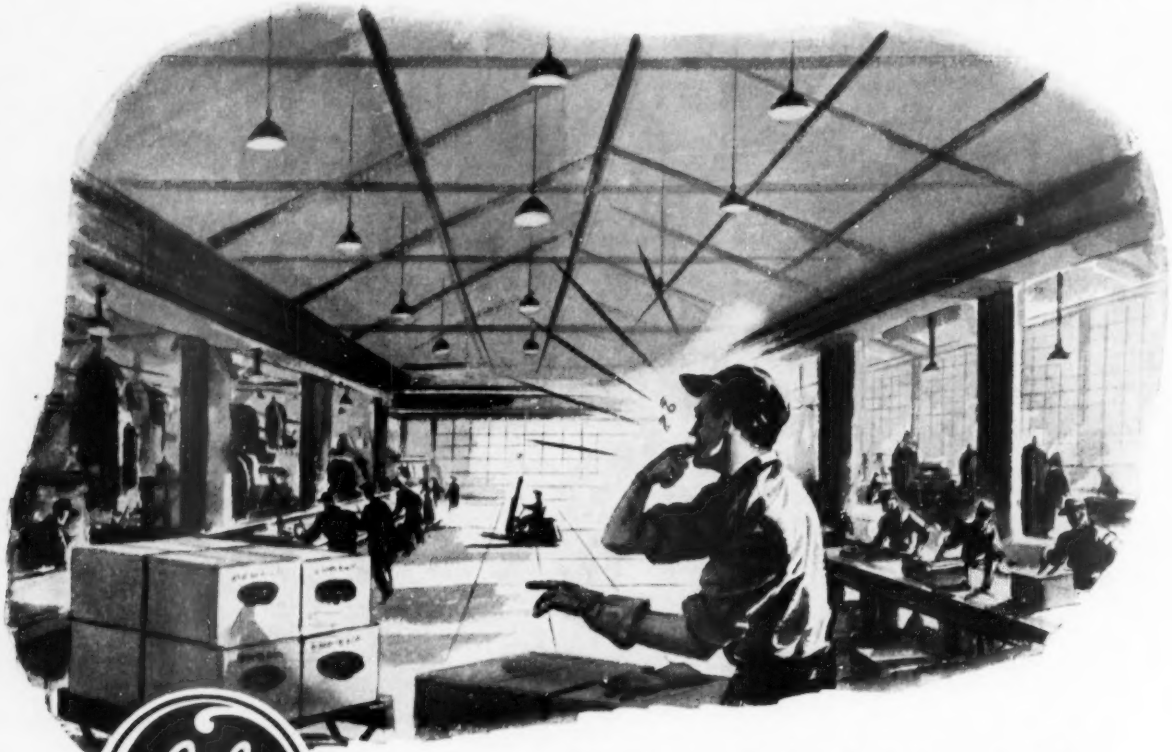
Order Tri-Clad motors today from your nearby G-E representative. You'll find popular models in stock. General Electric Co., Schenectady 5, N. Y.

752-20

You can put your confidence in—

GENERAL ELECTRIC

DON'T WHISTLE → Radio



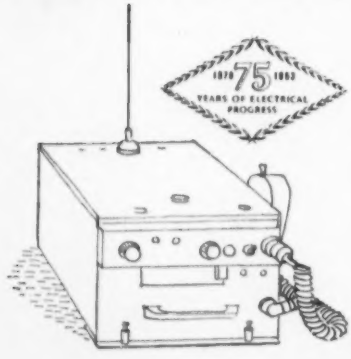
With General Electric 2-Way Radio your MH vehicles are instantly available!

IDEAL co-ordination of plant production keynotes General Electric's wide success in hundreds of industrial 2-way radio installations. Large and small plant owners alike who investigated the *economy* and ready adaptability of G-E radio to their functions report *production rates climb instantly! . . . operating costs drop radically!*

Today, progressive manufacturers can't afford to be without radio regardless of plant size. Nor, can they afford to settle for less than G-E's outstanding performance . . . rugged construction . . . low maintenance . . . industrial communications experience! Why don't you call the CAS* man at a local G-E office today or write: *General Electric Company, Section 6593, Electronics Park, Syracuse, New York.*

*Communications Advisory Service

RADIO can do it better!



You can put your confidence in—

GENERAL ELECTRIC

NEW ELECTRICAL EQUIPMENT

Begins on page 188

Intermediate-Size Magnetic Starter

Smaller than a conventional size 3 and larger than size 2, this intermediate size starter and connector is called 2½ by the manufacturer.

Unit should be a money-saver to many plants. Formerly. when the size 2 was inadequate for a job, a greatly oversized 3 unit had to be installed. This starter now splits the gap.

The controls which include reversing types are rated 20 hp. at 208/220 volts, 30 hp. at 440/550 volts.

Furnas Electric Co., 1032 McKee St., Batavia, Ill.

■

Precision Control for Resistance Welds

A synchronous-precision control for fast resistance welding of hard-to-weld metals has been announced.

The unit accurately regulates the current and the length of time it flows. This is important where short periods of weld current are needed for high-speed applications.

Ratings for this control are 180-280/410-510 volts, 60 cycles.

General Electric Co., Schenectady, N. Y.

■

Finds Faults in Jacketed Cable

A lightweight cable faultfinder for locating open circuits or low and high resistance shorts of 10,000 ohms or less has been marketed.

Can be used on rubber, neoprene, thermoplastic, and other similar jacketed cables. Both the transmitter and receiver are powered by standard dry cells.

Joy Manufacturing Co., Oliver Bldg., Pittsburgh.

Turn the page

BALDWIN-HILL uses FACTORY to help you keep heat losses down with

POWERHOUSE CEMENT

Here are six outstanding advantages:

- ONE COAT COVERAGE . . . It insulates as it finishes. Easy trowelling and quick hydraulic setting save time and labor in application.
- GREATER ECONOMY . . . 100 lb. covers 120 sq. ft. ¼" thick or 30 sq. ft. 1" thick. Low material cost and single coat application provide low over-all installation cost.
- NO WIRE MESH . . . In many instances can be trowelled directly on blocks, blankets, or other surfaces, thus saving costly application of reinforcement.
- DRIES WITHOUT CRACKING . . . Negligible lineal and volumetric shrinkage provides freedom from drying-shrinkage cracks.
- NO WEATHER WORRIES . . . Applied outside, it withstands drenching rain within two hours of application.
- PAINTABILITY . . . The smooth, firm, crack-free surface is perfect for finishing with oil-base or water-base paints.

For further information, get in touch with B-H Engineered Insulation Service.

Baldwin-Hill

Clip on signed letterhead and mail

TEAR OUT

BALDWIN-HILL COMPANY, 509 Breunig Ave., Trenton 2, N. J.

Please send complete information on

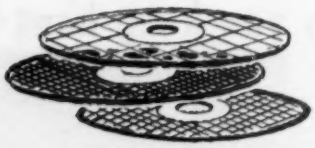
☐ POWERHOUSE CEMENT . . . High adhesion, rockwool, insulating-finishing cement

☐ BLANKETS . . . Metal-reinforced, flexible, felted, rockwool insulation

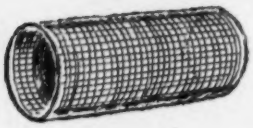
☐ NO. 1 INSULATING CEMENT . . . All-purpose, rust-inhibiting, plastic cement

☐ MONO-BLOCK . . . Rigid, felted rockwool block—for high and low temperature use

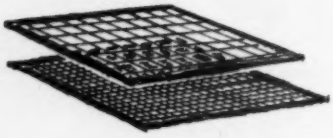
filter leaves?



strainers?



sizing screens?



Cambridge can build almost any type of wire cloth part to your specifications. Most likely the type of special wire cloth assembly you use has been built here in our plant. Our factory men can work from your specifications, or our Engineering Department can draw up working prints and specs based on merely your description of what the part must do. Why not let us quote the next time you need special wire cloth forms?

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...from warehouse or woven to order. We can also supply you with wire cloth in bulk for your own fabrication. Many common types are ready for immediate shipment from stock. And if your order needs special production, we'll schedule our looms to have the material in your plant without delay. We can weave wire cloth in any metal or alloy and in sizes from 20x250 mesh up to 4" openings.

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OFFICES IN PRINCIPAL INDUSTRIAL CITIES

NEW ELECTRICAL EQUIPMENT

Begins on page 188

Limit Switch for Heavy Duty

Explosion - proof heavy - duty limit switch for use on machinery and industrial equipment in explosive gas or vapor-air atmosphere is called IMLI-EI.

Approved by Underwriters' Laboratories for hazardous locations Class I, Group C and D. It is the smallest explosion-proof snap-action switch available, the manufacturer claims.

Die-cast aluminum casting has a porous bronze plate fitted over the enclosure opening to vent the switch cavity. This prevents any pressure build-up in the switch.

Minneapolis-Honeywell Regulator Co., Freeport, Ill.

■

Rectifier-Type Welder

A d-c rectifier-type welder designed to provide a stable and easy-to-handle arc has been developed.

Short circuit current is high enough to drive the arc without the use of gadgets, the maker claims.

Output current has a slight a-c ripple to reduce arc blow. When the arc is momentarily shorted, voltage recovery is almost instantaneous, the manufacturer adds.

National Cylinder Gas Co., 840 N. Michigan Ave., Chicago.

■

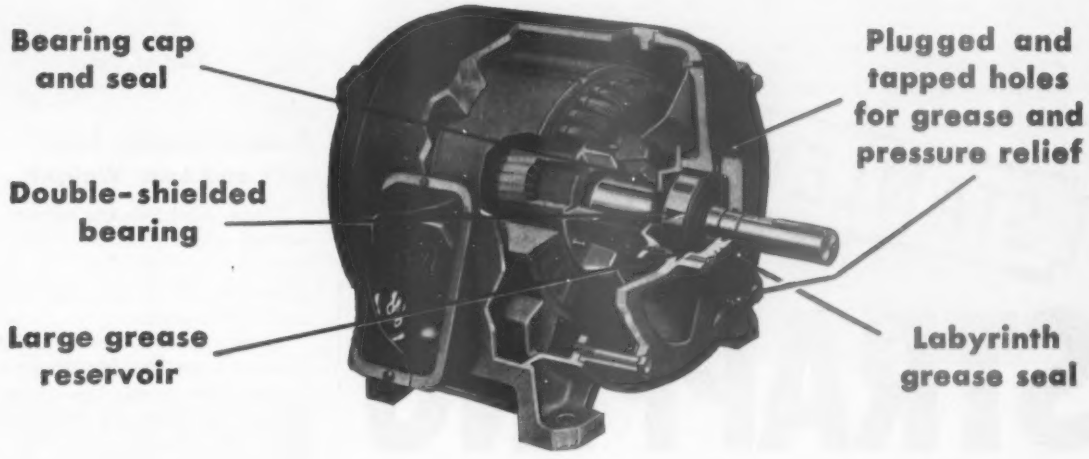
A 7-ELEMENT AUTOMATIC OSCILLOGRAPH for recording power system disturbances and photographically recording preselected magnitudes, wave shapes, and phase relations has been announced by the General Electric Co., Schenectady 5, N.Y. The readings of this unit will provide your plant engineer with helpful information on power line disturbances that will save him time and trouble.

Turn the page

Here Are Facts You Should Know About Electric Motor Bearings

An ideal motor bearing would operate for indefinitely long periods under all types of conditions without requiring any attention whatever. However, in the opinion of our engineers, such a bearing and its attendant lubricant are not yet available on the commercial market. Consequently, bearings for many types of operations, particularly where overloading, extreme temperature ranges and chemical and dirt laden atmospheres are involved, require special lubricants or regular lubrication schedules.

Of course, bearings suitable for many kinds of operation under normal conditions can be built to require no attention for very long periods — usually several years. Allis-Chalmers can supply sealed bearings in all frame sizes through 505 on short delivery and without extra cost for applications of this type.


Bearing cap and seal
Double-shielded bearing
Large grease reservoir
Plugged and tapped holes for grease and pressure relief
Labyrinth grease seal

Which is the Best Design for *Your* Application?

But, we believe that the design used in standard Allis-Chalmers drip-proof, tefc and explosion-proof motors represents the best design for most industrial users.

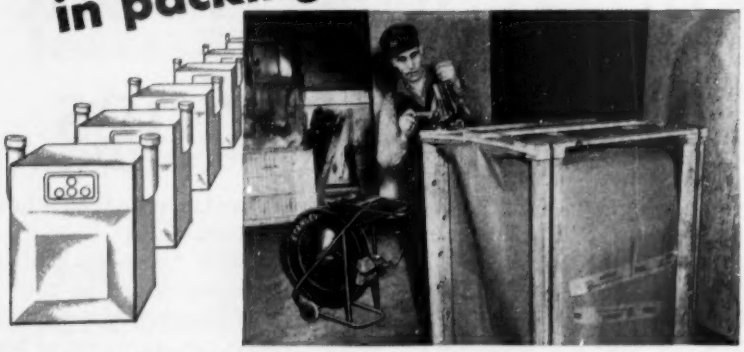
The Allis-Chalmers standard design consists of a prelubricated, double-shielded bearing mounted in the end housing with a generous grease reservoir. Plugged and tapped holes are provided for grease and for pressure relief. Under normal operating conditions, this design will operate as long without attention as any other type of bearing in use today. But where difficult operating conditions make relubrication desirable, it can be done as part of the normal lubricating-routine without dismantling the motor.

The large grease reservoir and shielded bearing design assure that grease lost from the bearing due to high operating temperatures or other causes will be replaced automatically.

For further information on bearing design and other features of Allis-Chalmers motors, call your nearby Allis-Chalmers District Office or Authorized Distributor. A-4130

ALLIS-CHALMERS

$20,000 saved yearly in packing gas meters



Costs were slashed from $25,000 to less than $5,000 annually at American Meter Co., Philadelphia by developing a new method of packing meters using the Stanley Steel Strapping System. Instead of packing them in conventional crates and boxes, gas meters are now steel-strapped between two wooden frames using plain boards as corner pieces. This method is fast, easy, economical. No nails are needed. Lumber is reused in return shipments to the company.

Very substantial savings are being made with the Stanley Steel Strapping System in packing and shipping products of every type. Why not see how much the Stanley Man can save *you?* He'll install the Stanley Steel Strapping System on a 30-day trial. No obligation. Just mail the coupon below.

STANLEY Reg. U.S. Pat. Off. STEEL STRAPPING SYSTEM*

*A MAN thoroughly experienced in steel strapping applications—the Stanley Packing and Shipping Engineer.

A METHOD adaptable to any requirement—the Stanley Steel Strapping System with representatives in 32 principal cities.

HARDWARE
TOOLS
ELECTRIC TOOLS
STEEL STRAPPING
STEEL

THE STANLEY WORKS, Steel Strapping Division
201 Lake St., New Britain, Conn.

☐ Yes—the 30-day trial interests me. Have the Stanley Packing and Shipping Engineer call.

☐ Send me complete information about the Stanley Steel Strapping System.

(Please write name and address in margin of page)

MATERIALS HANDLING

Trucks Feature High Lift and Low Weight

These two lift trucks are designed especially to solve the problem of low load limits in elevators. They are lightweight, high-lift trucks.

Both models are designed around a 360-deg. rotating power turret. The trucks have load capacities of 1500 and 2000 pounds. The load-truck-operator weight of either unit is 3500 pounds.

Each is powered by an air-cooled engine which will operate for 8 hours on one gallon of gasoline, the maker says.

The Knickerbocker Co., Jackson, Mich.

■

LIFT TRUCK WEIGHING COMBINATION lets you weigh materials while they are being transferred, stacked, or inventoried. The scale is attached to a steel arm welded to front of truck. Arm can revolve in a wide arc or be locked in place. W. C. Dillion & Co., Inc., 14620 Keswick St., VanNuys, Calif.

Turn the page

New Handling System Speeds Production of Grinnell Fittings

Until Grinnell Company switched from hand trucks to dependable Lewis-Shepard SpaceMaster Model "E" Electric Trucks, it had a tough problem handling small castings coming out of the foundry.

Before SpaceMasters . . .

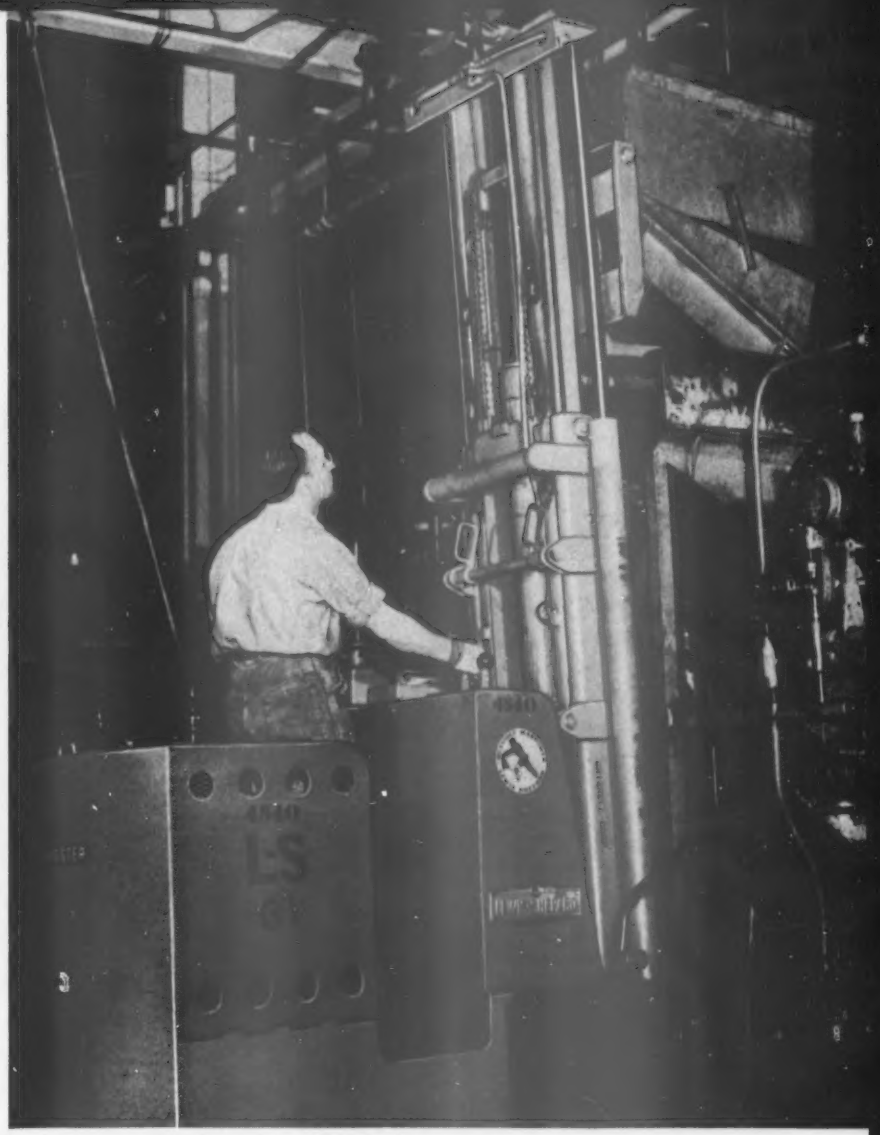
These space-eating, non-stacking shop barrels caught castings at end of foundry conveyor. Man with 2-wheeled hand truck lugged full barrel to a grinding machine. Machine operator, according to a Grinnell engineer, " . . . worked with one arm and his head in the barrel, his other arm in the machine."

After SpaceMasters . . .

Drop-bottom boxes catch castings from foundry conveyor. Lewis-Shepard Model "E" picks up box, carries it to a grinding machine, lifts it above feed hopper and dumps castings. Boxes can be stacked, stored efficiently.

About this Truck . . .

Lewis-Shepard's Standrive design permits safer trailing of load — operator has full, easy visibility to rear. Center control gives operator all 'round protection, permits him to get on and off quicker. Capacities to 4,000 lbs.



Lewis-Shepard SpaceMaster Electric Fork Truck lifts drop-bottom box to dump castings into feed hopper at a tapping machine.

The results at Grinnell, where man-handling was eliminated, storage efficiency improved and costs lowered, can point the way to greater efficiency for you. For full information regarding the cost-saving materials handling equipment from Lewis-Shepard, call your local L-S Representative or mail the coupon today. Case history Proof Folders include facts, figures and familiar company names. Handy Comparison Charts that help you to make your own decision are yours for the asking.

The MASTER Line

LEWIS-SHEPARD

16-9 Walnut St., Watertown 72, Mass.

Listed are some current L-S reorders from blue-chip companies in various industries.

Motor Car	45 L-S in use — reordered	2
Grocery Chain	73 L-S in use — reordered	6
Chemical	14 L-S in use — reordered	5
Elec. Goods	194 L-S in use — reordered	14
Carbon Mfr.	23 L-S in use — reordered	4
Mfg. Chemicals	74 L-S in use — reordered	6
Glass Mfr.	12 L-S in use — reordered	12
Rubber Goods	5 L-S in use — reordered	5

Please send me

- ☐ Proof Folders
- ☐ Electric Truck Comparison Charts

Name .....

Company .....

Address .....

City ..... State .....

Long Life Sealing...
For Any Packing Application

Quaker

SHEET PACKING

Packing that stays put! That's Quaker super-tough sheet packing. It stands up to vibration and pressure; resists deterioration by steam, gas, vapors, acids; stays pliable . . . and expands where it should. For low cost, long service and trouble free operation, re-pack with Quaker.

Write for name of nearest distributor.

Belting, Hose, Packing and Moulded Rubber of every construction for every need.

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MATERIALS HANDLING EQUIPMENT

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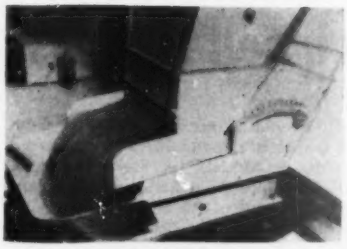


Vibrating Feeder Has Flexible Feed Rates

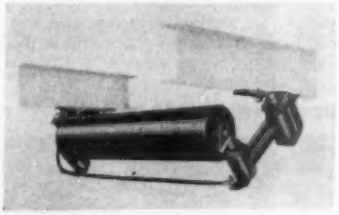
A vibrating solids feeder with rate of flow varying from 0.1 to 20 cubic feet per minute has been announced.

In addition to a wide output range, the machine will feed up as much as a 5-deg. slope. However, output decreases slightly with uphill feed.

Feed rate is lever-operated and can be changed at any time during a run.

Richardson Scale Co., Clifton, N. J.

■



Idler Reduces Belt Damage

Here's a self-aligning return idler designed to reduce the damage to conveyor belts.

Most of the roving in conveyor belts occurs when the belt is confined between the frame and the supports, and is out of sight. By preventing roving, belt wear can be reduced greatly.

This idler operates in one direction only. Comes with standard 5- and 6-in. diameter steel return rolls.

Chain Belt Co., Milwaukee, Wis.

Turn the page

This Test Shows Why

Trane Gas-Fired Unit Heaters give you

Maximum Heat Per Fuel Dollar!

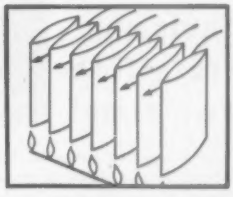
Hold your hand beside a flame. You can hardly feel the warmth! The heat rises rapidly in a narrow column—not toward your hand, *but straight up!* It escapes without heating your hand.

Now put your hand directly over the flame. You get the *full force* of practically all the heat generated by the flame. It hits your hand squarely—mushrooms out over the entire surface.

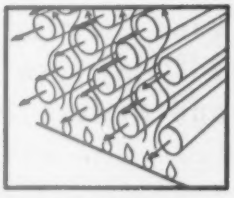
The NEW TRANE Gas Unit Heater

A.G.A. APPROVED—This great new heater, when tested by the American Gas Association against a long list of construction requirements, not only met the specifications—but surpassed them. It combines *increased output* with *unequaled strength* and *outstanding styling*. It gives you maximum heat transfer, maximum service, maximum efficiency.

EXCLUSIVE HEAT DIFFUSION—The patented TRANE Louver Fin Diffuser available with these units gives you complete command of air direction. Funnel it into a concentrated stream. Split it. Or spread it evenly over a wide area.



Conventional gas heaters have *vertical* chimney-like tubes. Heat rushes through in quick escape. Contact of heat with inside surface is brief. Heat escapes out the top. Room air is blown past the outside surface of the tubes. You can see why this can be so inefficient.



The new TRANE unit has *horizontal* "boiler tube" construction. Heat strikes tubes squarely—mushrooms around them, rises to the row above. Each tube is *bathed* in heat. Air to be heated is forced through tube's oven-like interior. Result: maximum B.T.U's per fuel dollar.

TRANE

GAS-FIRED UNIT HEATERS

Cut fuel costs . . . put heat where it's needed

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING AND VENTILATING EQUIPMENT

The Trane Co., La Crosse, Wis. • Eastern Mfg. Div., Scranton, Penn. • Trane Co. of Canada, Ltd., Toronto • 87 U. S. and 14 Canadian Offices

YOU CAN HAVE AN ANTI-CORROSION
RUBBER COVERING DEPARTMENT
RIGHT IN YOUR OWN PLANT!

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ARco Rubber Lining on your Chemical Equipment will Increase Protection and Reduce Down-time!

● ARco offers every rubber lining and covering facility in completely equipped plants at Detroit and Houston. If your chemical equipment cannot be moved and processed, ARco Field Service Units will come to you anywhere in the country. They will bring their skill and the best protective materials known to your locality.

Each ARco Field Service Unit is staffed with experienced craftsmen and supervisors. Their thorough knowledge of this specialized work is your assurance of complete satisfaction.

Let ARco Engineers advise you on your corrosion problems. Field estimates made on request.

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12566 BEECH ROAD AT P.M.R.R. ● DETROIT 28, MICHIGAN

●

ARCO RUBBER PROCESSORS
4033 HOMESTEAD ROAD ● HOUSTON, TEXAS

MANUFACTURERS ● DESIGNERS ● ENGINEERS

MATERIALS HANDLING EQUIPMENT

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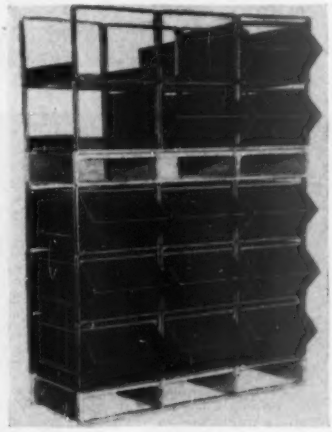


Pallet-Mounted Stackbin Set-Up

Parts and materials stored in Stackbins can be moved by fork truck when bins are mounted on a Stackrack double-faced pallet.

The bottom of the pallet interlocks with the top of the Stackrack assembly. Pallets are made of heavy-gage channel and formed steel.

Stackbin Corp., 1129 Main St., Pawtucket, R. I.

■

Dust-Tight Conveyor for Bulk Materials

Flowmaster, a dust-tight conveyor, moves bulk materials horizontally, vertically, or along an inclined plane.

Self-loading and self-discharging, this enclosed endless chain conveyor is specially fitted for medium- and low-capacity operations, the maker says.

Gifford-Wood Co., Hudson, N. Y.

■

FIVE ATTACHMENTS INCREASE THE FLEXIBILITY of Scoopmobile front loaders. Made by Mixermobile Manufacturers, 8027 N. E. Killingsworth, Portland 20, Oregon. Attachment are lift forks, backfill blade, crane boom, concrete hopper, and a dozer blade.

Turn the page

BEARING FAILURES ENDED

After Installing *Lincoln* Centralized Lubricant Application Systems *at New Haven Pulp and Board Co.*

[Bearings that once failed 2 to 3 times each week now have given trouble-free service for more than a year]

Roll Neck bearings on paper machine dryer rolls at the mill were failing at the rate of 2 to 3 times weekly, due to inadequate lubrication. E. G. Beach, Sales Engineer of the Motor Equipment Co., Bridgeport, Conn., recommended a completely automatic Lincoln Centralized Lubricant Application System. Now, after more than one year of operation, not a single bearing has been lost due to lack of lubrication.

Since the paper machine will operate only two hours without lubrication, the Lincoln system was provided with completely automatic controls. The lubrication cycle delivers .04 oz. of oil to each bearing, every ten minutes.

Previously, the dryer rolls had required ten barrels of oil each week for lubrication, and occasional excessive lubrication caused paper damage. With the Lincoln system, only two barrels of oil per week are required, and paper spoilage has been eliminated entirely.

As a result of this success with dryer rolls, New Haven Pulp and Board is now installing Lincoln systems on other paper-making machines and on printing presses.

SIMILAR SAVINGS CAN BE YOURS...

with a Lincoln Centralized Lubricant Application System. To find out more about how you can...

- *increase bearing life up to 1500%*
- *eliminate downtime for lubrication*
- *reduce power consumption*
- *prevent lubricant spoilage*
- *reduce labor costs*

...write today for your FREE copy of Catalog 80 containing complete data.

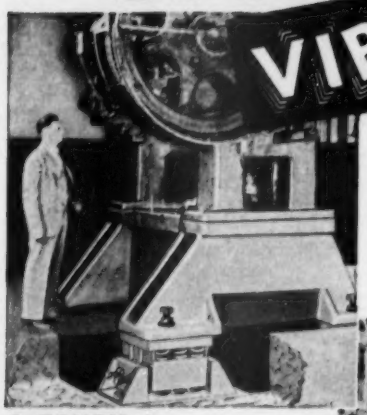
• • • PIONEER BUILDERS

LINCOLN ST. LOUIS

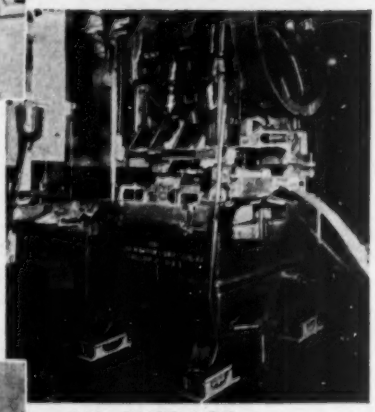
LUBRICATING EQUIPMENT • • •

LINCOLN ENGINEERING COMPANY • 5731 Natural Bridge Ave., St. Louis 20, Mo.

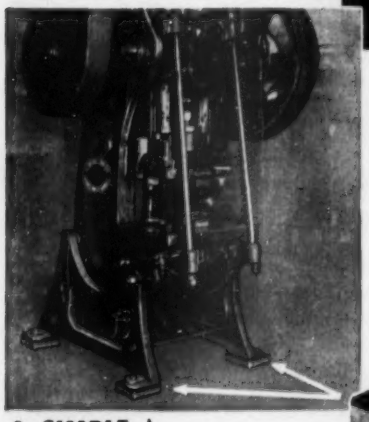
STOP VIBRATION *with* KORFUND VIBRATION CONTROL

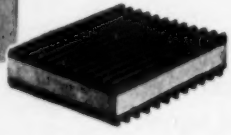


A TOUGH PROBLEM solved by specially designed Korfund Steel Spring Vibro-Isolators. Shock from this 100,000# 600 ton capacity press was cracking building walls. Four specially designed 25,000# capacity Korfund Steel Spring Vibro-Isolators, themselves weighing 600# each, were installed under the press. Building damage stopped and heavy production schedules were maintained. Yet, the price of the special Korfund Isolators was less than 3% of the press cost.



AN AVERAGE PROBLEM—typical of those solved every day by Standard Korfund Steel Spring Vibro-Isolators. Vibration and noise from this double crank press, which could be felt and heard throughout the building, were stopped by Standard Korfund Steel Spring Vibro-Isolators. More and more manufacturers are discovering how Korfund Vibro-Isolators permit press installation without reinforcement of floors, permit press installation *anywhere* (even near precision equipment) for better plant layout, increase press speed and production, improve quality.





A SIMPLE PROBLEM solved inexpensively and effectively by Korfund Elasto-Rib Pads. In this case, Elasto-Rib Pads installed under each of the legs of this press stopped transmission of vibration and noise. For the less critical installation, Korfund Elasto-Rib Pads provide low-cost, effective vibration and noise control, and eliminate bolting to the floor.

PUNCH PRESSES are notorious for the amount of vibration and noise they transmit—yet in the three cases illustrated, Korfund Vibration Control units successfully solved the problem. In our files are scores of case histories describing equally satisfactory installations on many other types of machinery.

A selector chart is available giving recommendations for various vibration control problems. Write for your copy of Bulletin No. 13, or see our catalog in Sweet's Files.

For specific recommendations, contact us or the Korfund representative you'll find in most principal cities. A half-century of experience is at your disposal.

THE KORFUND CO., INC.

KORFUND VIBRATION CONTROL — SPRINGS — RUBBER — CORK

48-33C Thirty Second Place, Long Island City 1, N. Y.
In Canada: 510 Canal Bank, Ville St. Pierre, Montreal

MATERIALS HANDLING EQUIPMENT

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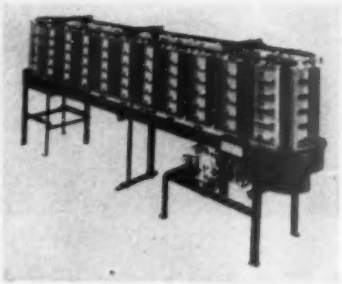


Table-Cable Conveyor

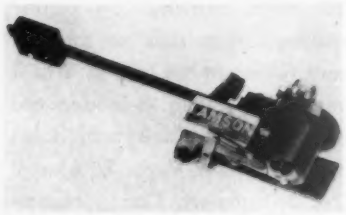
Here's a versatile, table-height, power-driven cable conveyor with 4-wheel carriers attached to a ⅜-in. steel cable.

All sorts of material carrying devices, such as pallets, shelves, trays, fixtures, etc., can be attached to the conveyor trolleys.

Although designed for table-height use, it can be used at other heights, and floor- or ceiling-mounted.

E. W. Buschman Co., 4401 Clifton Ave., Cincinnati 32.

■



Overload Protector for Chain Drives

A device to protect all types of chain drives from overloads has been developed. It trips a limit switch if excessive tension occurs on the drive leg.

Operates with any chain tension up to 1000 pounds. The design is simple, rugged, and maintenance-free, the maker says.

Can be adapted to chain sizes from ½ to 1¼ inches. Electrical capacity of the limit switch is 10 amperes at 115 volts a-c.

Lamson Corp., Syracuse, N. Y.

Turn the page

an easy way to cut your production costs

OILITE does it—

with FINISHED MACHINE PARTS

$.70

$.08

$1.30

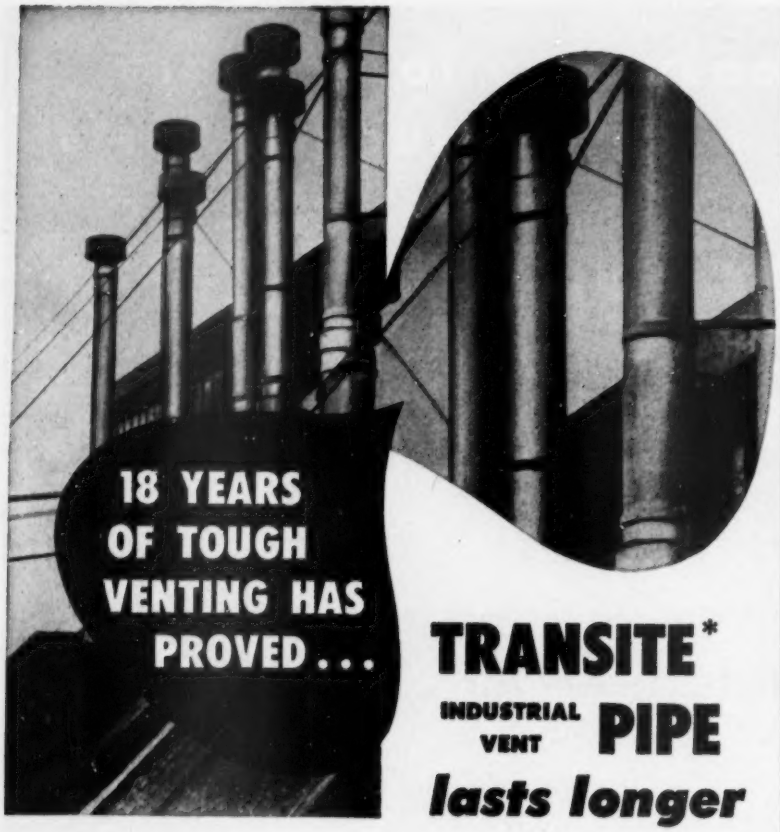
$.07

Other Advantages Include:

- No investment in machine tools
- No costly tooling programs
- Releases skilled manpower to other jobs
- No material supply problems

FIELD ENGINEERS AND DEPOTS THROUGHOUT UNITED STATES AND CANADA

Oilite Products Include: Bearings, Finished Machine Parts, Cored and Solid Bars, Permanent Filters and Special Units.



TRANSITE* INDUSTRIAL VENT PIPE *lasts longer*

Transite Industrial Vent Pipe is known to many users for its exceptionally long service life. In lines where aggressive gases, fumes and vapors are present, it has proved itself time and time again. Maximum corrosion resistance is imparted to asbestos, cement and silica during manufacture which includes a special Johns-Manville steam curing process. Transite has paid for itself, sometimes over and over again, on many installations.

In addition, Transite Industrial Vent Pipe cannot rust. It needs no painting or other protective treatment. It has been used as ducts, vents or stacks for 15 to 20 years and longer . . . remaining in excellent condition . . . outlasting other material by a wide margin. (Transite has served the factory shown above for 18 years.)

Transite is light in weight and easy to handle. It can be cut and drilled with ordinary tools. It comes in a complete range of sizes up to 36″ in diameter. A full line of corrosion-resistant Transite fittings makes it adaptable to practically any job requirement.

For further details on Transite Pipe for your venting problems, simply fill out and mail the coupon to Johns-Manville, Box 60, New York 16, N. Y. In Canada: 199 Bay Street, Toronto 1, Ontario.

*Transite is a registered Johns-Manville trade mark

Johns-Manville
TRANSITE
Industrial Vent
PIPE

Johns-Manville
Box 60, New York 16, N. Y.
Gentlemen: For facts about longer-lasting vent pipe, please send me Data Sheet Series DS-336.

Name_____

Address_____

City_____ State_____

MATERIALS HANDLING EQUIPMENT

Begins on page 196

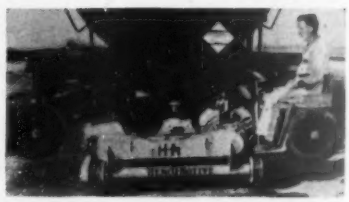
False-Bottom Hamper for Easy Unloading

False bottom suspended by tension springs keeps work at rim-level of canvas hampers and baskets.

Called Automatic Lift. Bottom descends as work is loaded into the basket and rises as work is removed. Designed to reduce worker fatigue by eliminating the need for reaching into the container.

W. T. Lane & Bros., Inc., Poughkeepsie, N.Y.

■



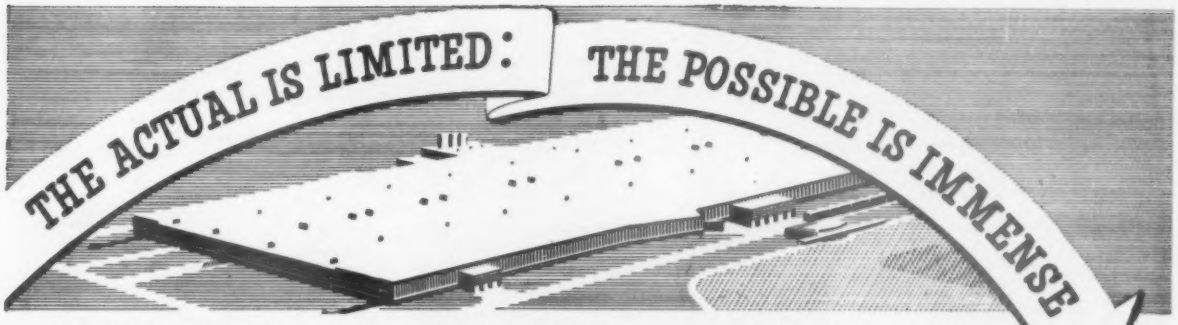
Roadable Switch Engine Spots Railroad Cars

Hemco-Motive solves the problem of spotting and switching railroad cars. The roadable switch engine will pull any rail car through switches, over crossovers, and around curves.

Operator can see the full length of his train. Its draw bar pull of 7400 pounds can move three fully loaded cars or 6 to 8 empties.

Hemco Manufacturing Inc., Argonia Kan.

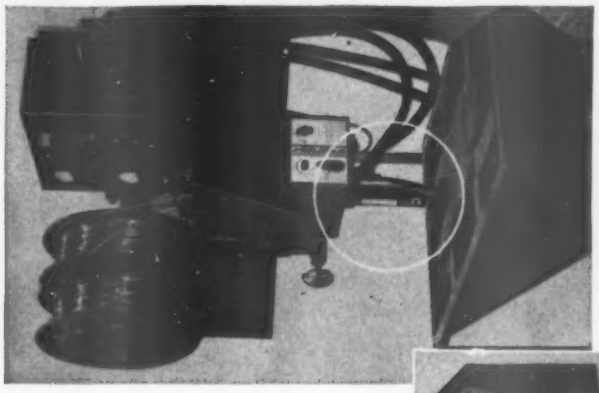
Turn the page



NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

© LE Co. 1953

"TWINARC'S" FASTER, LOWER COST WELDING BOOSTS SHOP EFFICIENCY



IT is now possible to realize savings up to 35% in the cost of automatic welding with Lincoln's new "TWINARC". Welds have deeper penetration, greater uniformity . . . and are produced at *speeds 50% higher* than possible with single electrode automatic welding.

Reports from code welding fabricators indicate quality superior to conventional automatic processes.

With "TWINARC", welding currents up to 1200 amps are concentrated on two small diameter electrodes (Fig. 1). These electrodes can be set in line with the work for tandem welding to attain maximum penetration at high speed. For welding thin material or assemblies with poor fitup the "TWINARC" head may be rotated in any position to 90 degrees across the joint to spread the arc, reducing the danger of burning through.

"TWINARC" welding is only one of many new Lincoln developments designed to cut your costs. Have your representative survey your needs and recommend latest Lincoln techniques to speed welding, to simplify your operations and save money.

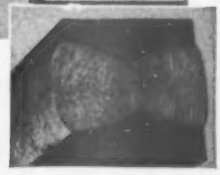


Fig. 2. Automatic Lincolnweld LAF-2 *with new "TWINARC" attachment. "TWINARC" replaces original single electrode jaws. Operates with same single controls. Inset shows butt weld in 1-½" plate with single pass on each side with "TWINARC". Welding speed is 38% faster than possible with single electrode.*

INCREASES WELDING SPEEDS 50% AND HIGHER! TO CUT YOUR COSTS

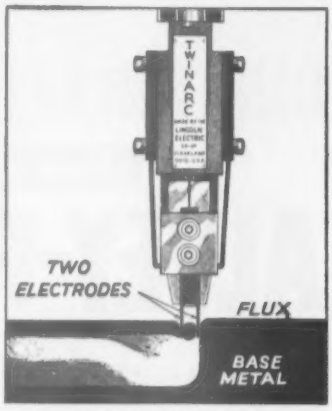


Fig. 1. New Lincoln "TWINARC"... *feeds two continuous electrodes simultaneously for faster, more efficient "hidden arc" welding in granular flux.*

Results... utilizes currents up to 1200 amps, produces deeper penetration, higher quality welds, at lower cost.

HANDLES A WIDER RANGE OF WORK

ANOTHER LINCOLN FIRST

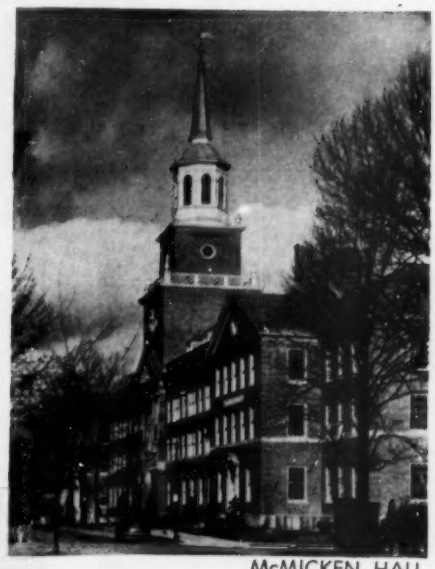
GET THE FACTS — *Bulletin on "TWINARC" welding giving latest speeds and procedures is available by writing on your letterhead to Dept. 3704.*

THE LINCOLN ELECTRIC COMPANY

CLEVELAND 17, OHIO

THE WORLD'S LARGEST MANUFACTURER OF ARC WELDING EQUIPMENT

● To the University of Cincinnati come serious minded, thoughtful, brilliant young men to "co-op" in engineering offices, plants, factories. Many have joined The Alvey-Ferguson Co. engineering and sales staff and fused youthful enthusiasm and daring new approaches to conveying systems, with mature experience and years of leadership.



McMICKEN HALL

CINCINNATI

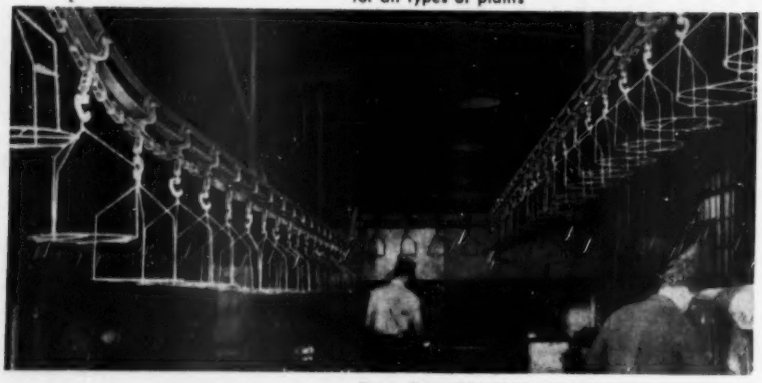
home of

ALVEY-FERGUSON

the original-Since 1901

engineered conveying systems

A-F Engineers all types of conveying systems for all types of plants



For a discussion of latest efficient handling methods write —

A-F THE ALVEY-FERGUSON COMPANY

139 Disney St., Cincinnati 9, Ohio

OFFICES AND REPRESENTATIVES IN PRINCIPAL CITIES

MATERIALS HANDLING EQUIPMENT

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Combination Hand Truck and Stepladder

Here's a combination steel hand truck and stepladder. It's called Step-Truck.

Can be used by maintenance men to carry their supplies to the job; then as a ladder to permit them to reach out-of-the-way places.

Fairbanks Co., 393 Lafayette St., New York.

■

Fork Lift Truck Hoist Protector

Designed especially for fork lift trucks operated in dusty and abrasive conditions, the hoist protector telescopes upward and downward to match the movements of the lift plunger.

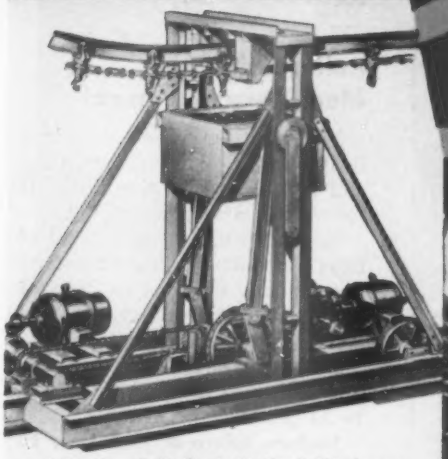
This action constantly protects plunger from pitting and scoring by abrasives. Adaptable to six models of Towmotor lift trucks.

Towmotor Corp., Cleveland.

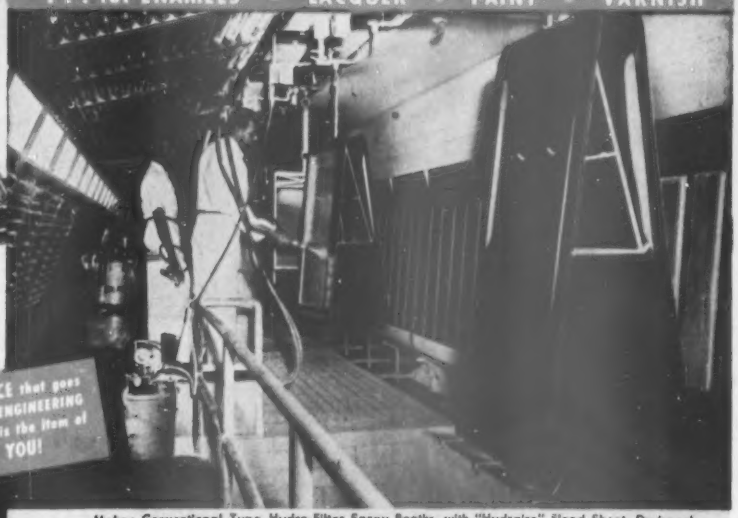
Turn the page

COMPLETE *Finishing* SYSTEMS

. . . for ENAMELS • LACQUER • PAINT • VARNISH

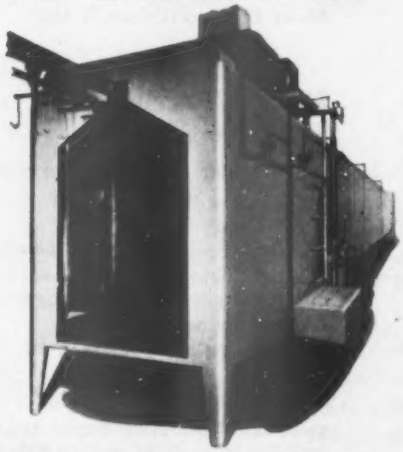


Mahon Automatic Dip-Coating Machine. Paint tank moves up and forward at conveyor speed to immerse parts. It then lowers away and moves back to its original position and repeats. Paint Level and Temperature is maintained by continuous circulation through Flexible Lines.



Mahon Conventional Type Hydro-Filter Spray Booths, with "Hydraire" Flood Sheet, Designed to meet the Specific Requirements of a Home Appliance Manufacturer.

Interior View of Typical Mahon Dip-Coating equipment. The Finish Baking Oven is located above this enclosure.



Typical Mahon Flow Coating Machine and Drip Tunnel. Automatic controls and equipment can be provided to maintain constant temperature of coating material.

Should YOUR PRODUCT be SPRAYED, DIPPED or FLOW COATED? or does it demand a COMBINATION of these COATING METHODS?

In some plants, where our advice on finishing methods has been sought, we have found parts being flow coated when substantial savings could have been effected in the over-all finishing costs through the employment of the dip method—savings in thinner, paint, initial cost of equipment and maintenance...and the dip method, in this particular operation would have provided a better finish with fewer rejections. It is therefore wise to get expert advice when confronted with a finishing problem, regardless of what the part or product may be. Many factors enter into the basic and all-important decision on method or combination of methods to be employed to produce the finest results at the lowest possible unit cost. Mahon engineers, with a background history covering thousands of complete finishing systems—including Dip, Flow Coating and Spray Equipment—are in a position to make sound, unbiased recommendations on the "HOW" to finish any product under any conditions or production requirements. Over thirty years of experience in planning, designing, building and installing finishing systems of every type for every conceivable product painted on a production basis, has equipped Mahon engineers with a wealth of technical knowledge and practical know-how not available to you elsewhere . . . can you afford to rely on less when so much is at stake? See Mahon's Insert in Sweet's Plant Engineering File, or write for Catalog A-654.

THE R. C. MAHON COMPANY

HOME OFFICE and PLANT, Detroit 34, Mich. • WESTERN SALES DIVISION, Chicago 4, Ill.

Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning, Pickling, and Rust Proofing Equipment, Hydro-Filter Spray Booths, Dip and Flow Coaters, Filtered Air Supply Systems, and Drying and Baking Ovens; Core Ovens, Heat Treating and Quenching Equipment for Aluminum and Magnesium, and other units of Special Production Equipment.

MAHON

the right "intake" for grinding "output"

SIMONDS ABRASIVE CO.

Grinding Wheels

To turn out top quality production, take in top quality wheels . . . Simonds Grinding Wheels. They're second to none in quality, economy, dependability . . . and in the variety and completeness of the line they comprise. It includes grinding wheels, mounted wheels and points, segments and abrasive grain . . . everything you need for roughing, finishing, cutting off, sharpening, polishing. No matter what *your* jobs call for, call on your Simonds distributor for prompt service that gives you superior grinding wheel performance.

Write for free data book and name of your Simonds Distributor.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON

DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N.Y. Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

MATERIALS HANDLING EQUIPMENT

Begins on page 196

Roller Skids Aid Machinery Movement

The Multiton roller skid is a heavy-duty dolly working on the self-laying track principle. It moves like a tank or tractor.

Especially useful for moving of heavy machinery. Because of its design, this dolly is capable of supporting 3200 times its own weight, the maker claims.

The units are 4 inches wide, 8 to 12 inches long, and weigh 10 to 30 pounds.

Stokvis Edera & Co., Inc., 95 Madison Ave., New York 16.

■

Aluminum Tanks for Materials Storage

Standard aluminum tanks for the storage of materials at atmospheric or low pressures are now available. Previously all tanks were tailor-made to customers' specifications.

All tanks have a 20-in. manhole, either fixed or swing type. Capacities range from 5800 to 16,400 gallons.

Aluminum Co. of America, 1501 Alcoa Bldg., Pittsburgh 19.

■

Stacker Permits Selective Storage

Trambeam Stacker Crane combines the functions of a fork truck and a crane.

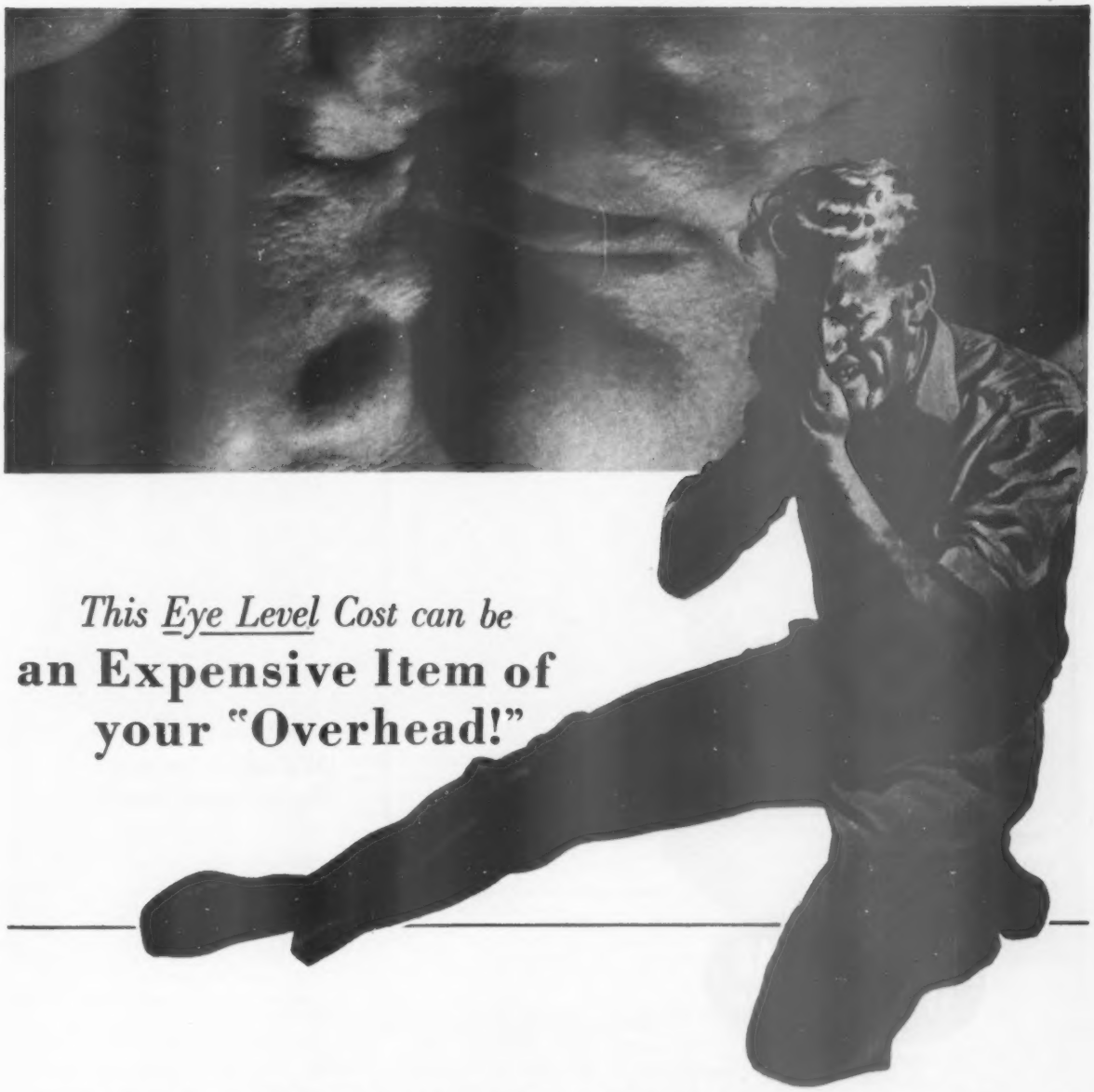
Stacking mast is suspended from girder crane. The mast requires only one foot clearance in addition to width of load.

Whiting Corp., Harvey, Ill.

■

SHOP AND SHIPPING ROOM SCALE in 1000, 2000, 5000, and 10,000-lb. ranges is being made by the A. H. Emery Co., New Canaan, Conn. Designed to fit any crane or hoist, it adds slightly over 19 inches to the required headroom.

Turn the page



This Eye Level Cost can be

an Expensive Item of your "Overhead!"

No one knows how much a jury will award in an eye accident case, but it's easy to know how much can be saved by an adequate protection program!

Apart from compensation costs which have soared in recent years, and increased first aid and medical expenses, *you'll save:*

1 Lost man hours — very important in a tight, high cost labor market.

2 Idle time of the injured worker's machine.

3 The cost of lowered output of adjacent workers and machines. "I may be next" thinking hurts morale.

4 The cost of increased rejects when substitute workers take over for key men.

What's the cost of eye accidents in actual money? More than $5.00 *per employed worker* per year. What's the cost of prevention? About $2.30 per *exposed* worker when a tested, proved AO Program is installed.

Ask an AO Safety Representative in. Or write American Optical Company, 539 Vision Park, for free booklet "Improved Industrial Vision." It tells how AO's Industrial Vision Program *cuts* costs, *increases* production, *decreases* accidents.

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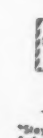


"Stay in the Safety Zone with AO Safety Equipment"

American Optical

SAFETY PRODUCTS DIVISION

Southbridge, Massachusetts

BRANCHES IN PRINCIPAL CITIES

Handle Heavy-duty Jobs Faster! Safer! Easier!

with a

HEIN-WERNER

HYDRAULIC JACK

MODEL 50.12AA
50 TON CAPACITY

This compact Hein-Werner Jack is ideal for moving heavy machinery, pulling gears and pinions, bending pipe, as the power unit for presses, or countless other industrial applications. No crews or helpers are needed. Confusion and wasted man-hours are avoided.

The ruggedly-built Hein-Werner Model 50.12AA packs 50 tons of power. Sturdy handles simplify carrying and positioning . . . fall flush against jack housing when not in use. Tandem pump speeds travel of ram to load. Solid steel base is drilled for installation of pressure gauge. Safety valve prevents overloading. Factory tested at 1½ times rated capacity.

See your industrial supply distributor or write us

Hein-Werner Hydraulic Industrial Jacks are available in models of 1½, 3, 5, 8, 12, 20, 30, 50, and 100 tons capacity. 12 ton and larger models have carrying and positioning handles. Hein-Werner also manufactures "Push and Pull" Hydraulic Jacks of 4, 10, and 20 tons capacity, and "Pushmaster" Hydraulic Jacks of 4 tons capacity.

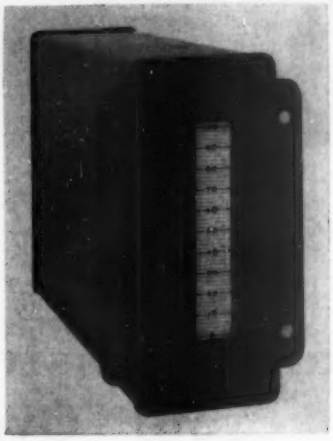
Hein-Werner HYDRAULIC JACKS

HEIN-WERNER CORPORATION
WAUKESHA • WISCONSIN

WHAT'S NEW IN EQUIPMENT

Begins on page 166

MEASURING & CONTROL



Indicator Designed for Graphic Panels

This ribbon-type indicating receiver is especially suited to graphic-panel applications where continuous indication of valve position or variables such as liquid level are required.

It receives pneumatic measurements from a transmitter located at the process. The complete mechanism of this instrument can be removed from its housing without disturbing the scale, case, or panel.

Available with single or dual indicating scales.

Foxboro Co., Foxboro, Mass.

■

Pocket Pyrometer

Pocket pyrometer will give you fast and accurate readings of surface and subsurface temperatures by using interchangeable thermocouples.

Available in five standard ranges.

Cybertronic Corp., of America, 136 Eighth St., Chester, Pa.

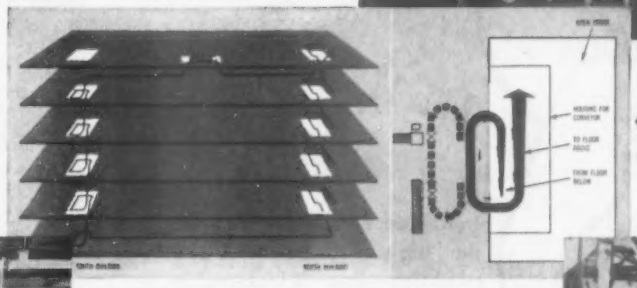
Turn the page

WEBB

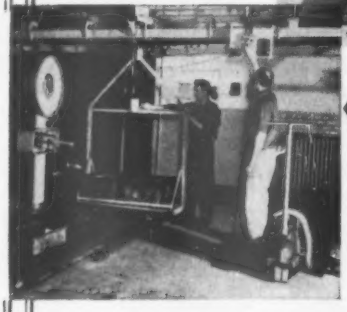
Power and Free CONVEYORS

"Unstack" Six Floors

Key:
—— Main Conveyor
– – – Loading Station

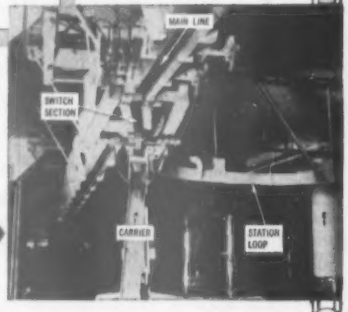


How a loading station works.



Operator (right) pushes button to automatically switch next empty carrier from main line to his station loop. Man at left dials on selector switch the destination of loaded carrier.

Note automatic switch for channeling proper carriers from main line to station loop.



With Webb "Power" and "Free" conveyor system Stewart-Warner now gets the benefits of single-story operation in their multi-story buildings. The conveyor system will pay for itself through savings in *indirect labor costs* alone (truckers, elevator operators, stock chasers). Perhaps even greater benefits are derived from the savings afforded by *lower inventory* and *improved production scheduling* through:

More effective supervision of materials handling • Less damaged parts
Speedier parts delivery between operations • Fewer misplaced loads
Better and controlled utilization of fork trucks and elevators

This conveyor system, which is 2099 feet long, can be adjusted to run at any speed from 10 to 60 fpm. Selector switches on each carrier automatically switch carriers off main line onto selected station loop for storage, loading or unloading. In addition, station operators by simply pushing a button at their station can switch empty carriers into their loop. Conveyors inclined 30° ascend and descend between floors in housings made of light structural steel and located in two open courts.

Conveyor Engineers and Manufacturers

Send for fully illustrated catalog that provides complete information on Webb conveyors.

OFFICES IN PRINCIPAL CITIES OF THE WESTERN HEMISPHERE AND LONDON, ENGLAND
FACTORIES: DETROIT • LOS ANGELES • HAMILTON, ONTARIO

WATCH OUT, ALFONSO, ONE TUMBLE'S ALL IT TAKES...

Indifference—whether it's under the "big top" or on the production line—is inexcusable and often fatal. You simply can't afford to take chances with a hard won reputation for quality performance. That's why we say it's a pretty good rule to stick to a solder you know and trust ... time-proved Kester Solder, constant in solder alloy and always a consistent flux formula.

For the right Solder ... the exact Solder you require ... choose KESTER, the job-engineered Solder—8 Fluxes in Core Solder, available in 5 core openings. Also remember: Kester Solid Wire and Bar Solder, Kester "Solderforms" and separate Fluxes.

KESTER

SOLDER COMPANY

4213 WRIGHTWOOD AVENUE, CHICAGO 39, ILLINOIS
NEWARK 5, NEW JERSEY; BRANTFORD, CANADA

MEASURING & CONTROL EQUIPMENT

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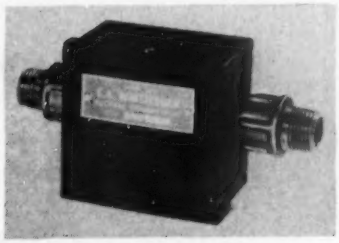


Magnetic Flow Indicator Switch

Here's a magnetically coupled flow-indicating switch for controlling electrical circuits that signal flow or non-flow of liquids through pipe lines. Can be used with water or other liquids not injurious to brass or copper.

A movable vane within the flow tube senses the flow. Variations cause a chrome-plated magnet to actuate contacts of a mercury magnetic tube outside the flow tube.

Winterburn Manufacturing Co., Putnam, Conn.

■

Instrument Records Variable Sequence

Here's an instrument that records in sequence the values of three variables at 20 different points. Adaptable to any physical measurement for which a sensing element can provide an electrical output.

Will sample and record all 60 readings in approximately 2 minutes. Measurable variables include current, power, strain, humidity, liquid flow, liquid level, speed, and displacement.

Hastings Instrument Co., Hampton, Va.

Turn the page

Whatever your storage needs-

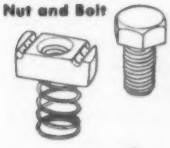
you can build RACKS better, faster, at lower cost with adjustable UNISTRUT® Metal Framing

With UNISTRUT there is no drilling, no welding, no special tools or skilled help needed—just a wrench and a saw. All you do is cut channel to size and bolt fittings in place. It's easy to work with, can be used again and again without waste or additional investment. Let us make a free rack survey for you and demonstrate savings of time, space, labor and material.

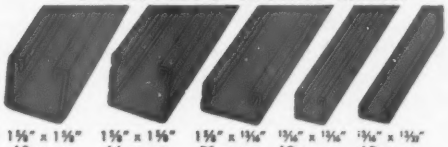
1. One of several UNISTRUT bar stock racks installed in plant of large aircraft manufacturer. Here is strength without bulk.
2. UNISTRUT pallet racks installed in textile manufacturer's warehouse to store bulky cartons and bales.
3. Extensive installation of UNISTRUT general storage racks in large warehouse.
4. Time and labor saving UNISTRUT reel rack located in large industrial supply company warehouse.

Only the UNISTRUT Framing System has this Positive Clamping Action at all Points of Connection!

UNISTRUT Nut and Bolt

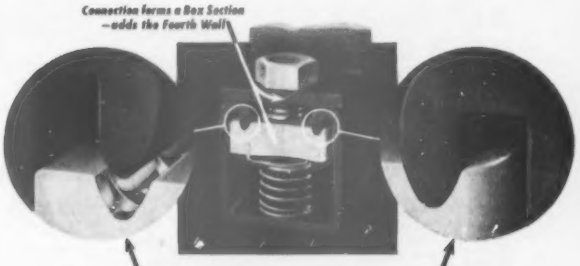


5 Basic Sizes of UNISTRUT Channel



1⅝" x 1⅝" 12 gauge | 1⅝" x 1⅝" 16 gauge | 1⅝" x 1⅝" 14 gauge | 1⅝" x 1⅝" 19 gauge | 1⅝" x 1⅝" 19 gauge

9 out of 10 UNISTRUT Racks can be built with these basic UNISTRUT Fittings



Hardened Nut has Corrugated Grooves which bite into Interned Edges for Positive Clamping Action

Interned Edges can't Buckle or Spread. Nut-to-Channel Locking Action holds Side Walls in Original Position

This Pyramid Shaped Edge has ⅓ more Bearing Surface than ordinary Flat-Edged Channel and Flat-Surfaced Nut

See our Catalog in Sweet's Plant Engineering, Industrial Construction and Architectural Files

UNISTRUT®

The World's Most Flexible All-Purpose Metal Framing

Distributors and Warehouse Stocks in Principal Cities. Consult your Telephone Directories

U. S. Patent Numbers
2327587 2380379
2363382 2345650
2541908 2405631
2329615
Other Patents Pending

UNISTRUT PRODUCTS COMPANY
1013 W. Washington Blvd.,
Chicago 7, Ill. Dept. M9

Write for FREE 24-page fully illustrated Rack Catalog No. 600.

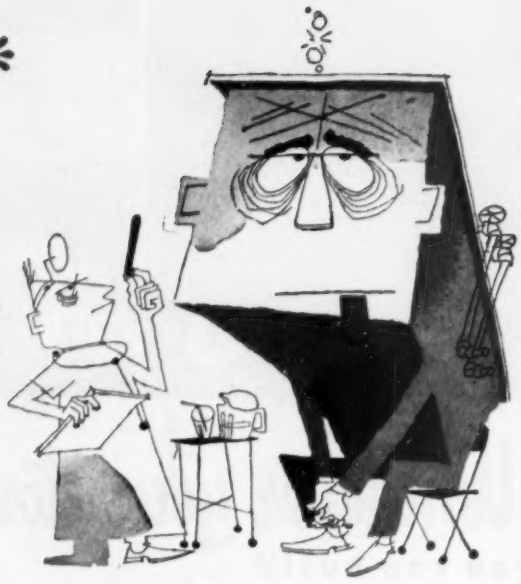
Please send me a copy of Rack Catalog No. 600, without obligation.

Name_____ Address_____

Company_____ City_____ Zone____ State_____

is

coil-itis* increasing your temperature problem?



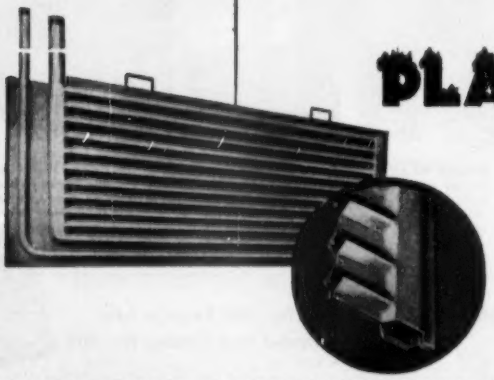
Here is a new treatment for solving your heat transfer problems that is as revolutionary as a new wonder drug. It stops coil-itis* cold . . . It eliminates the many troubles that have plagued industrial heating and cooling practices due to the use of old-fashioned, outmoded pipe coils. This revolutionary new unit, called a Platecoil, heats or cools 50% faster and takes 50% less space in the tank. It simplifies maintenance and saves hours of downtime.

Write for bulletin P60 today!

PLATECOILS SAVE 50% IN HEAT TRANSFER COSTS

PLATECOILS COOL QUENCH OIL TANK FOR ⅓ THE COST

At the K-D Manufacturing Company, Platecoils are proving more efficient, yet cost only 1/3 as much to install. Ask about other case histories.



PLATECOIL

REPLACES PIPE COILS

*

Coil-itis — Diagnosed as tank heating and cooling problems. Platecoils — the prescription for solving pipe coil problems.

PLATECOIL DIVISION, TRANTER MANUFACTURING, inc., LANSING 4, MICHIGAN

MEASURING & CONTROL EQUIPMENT

Begins on page 210

Elapsed-Time Meter Also Records Date

This elapsed-time recorder automatically dates job-time cards, reducing possibility of clerical errors.

The instrument prints starting time, finishing time, total elapsed time and date. Elapsed time on card is shown with lunch time and other non-working periods automatically deducted if desired.

Calculagraph Co., Inc., Sussex St., Harrison, N. J.

■

Temperature Indicator Gives Fast Response

A temperature-indicator that responds to temperature changes in two seconds or less has been marketed.

It is a self-contained, battery-powered electrical bridge-type thermometer. Eight models are available to cover the temperature range from –20 F. to 220 F.

Associated Research, Inc., 3758 W. Belmont Ave., Chicago.

■

THERMAL RELAY FOR EYE-LEVEL MOUNTING has been marketed by Electric Auto-Lite Co., Toledo 1. Relay unit has three 15-amp. single-pole, double-throw microswitches for controlling fans, warning signals, and cutouts. Plain wells or special wells for heater coils can be furnished.

Turn the page

YOUR CARBOLOY FIELD ENGINEER SAYS...

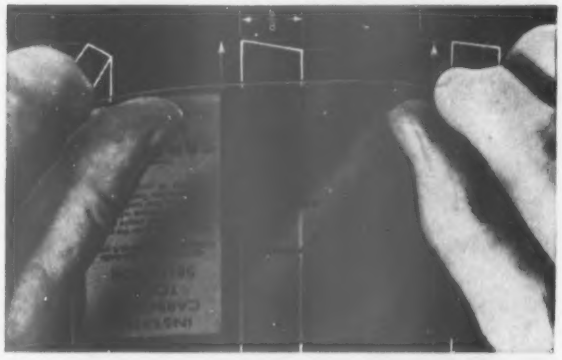
"Large, costly inventories of special tools now unnecessary"

"Cut your special single-point tool stocks up to 30% with this simple-to-use MTI Plan

"The Minimum Tool Inventory Plan is based on the fact that just 11 Standard Carboloy® Tools can be adapted to do up to 80% of your special single-point jobs . . . thus eliminating many costly, made-to-print tools.

"The MTI Plan will show you which 'specials' can be eliminated, and exactly how much you'll save. With the 15% price reduction on Standard Carboloy Cemented Carbide Tools, in effect since June 22, now, more than ever before, it pays to standardize."

Write today for your free MTI Plan Kit. Then, determine your *own* benefits from the MTI Plan as follows:



1. **Using the Instant Tool Selectors,** you'll see at a glance how only 11 Standard Carboloy Tools can be easily and quickly adapted to handle 4 out of 5 of your special, made-to-print tool jobs.

2. **With the handy Plan Sheets provided,** you'll quickly get a dollars-and-cents answer showing how much you'll save by standardizing. Simple subtraction shows you how much your inventories can be cut by using Standards.

3. **Order the Standard Tools** you'll need from your Authorized Carboloy Distributor. Use them "as is" or quickly grind them to your specifications. Grinding hints, price lists and Standard Tool specifications are included in kit.

CARBOLOY

DEPARTMENT OF GENERAL ELECTRIC COMPANY

11135 E. 8 Mile Blvd., Detroit 32, Michigan

The use of Carboloy Cemented Carbides for cutting tools is just one of the countless ways that Carboloy created-metals benefit industry. Look to Carboloy metallurgists to bring even broader fields of use for present and future Carboloy created-metals.

ALNICO PERMANENT MAGNETS
for lasting magnetic energy

CEMENTED CHROME CARBIDES
for exceptional resistance to corrosion, along with abrasion and erosion resistance

CEMENTED TUNGSTEN CARBIDES
for phenomenal cutting, forming, wear resistance

HEVIMET
for maximum weight in minimum space, and for radioactive screening

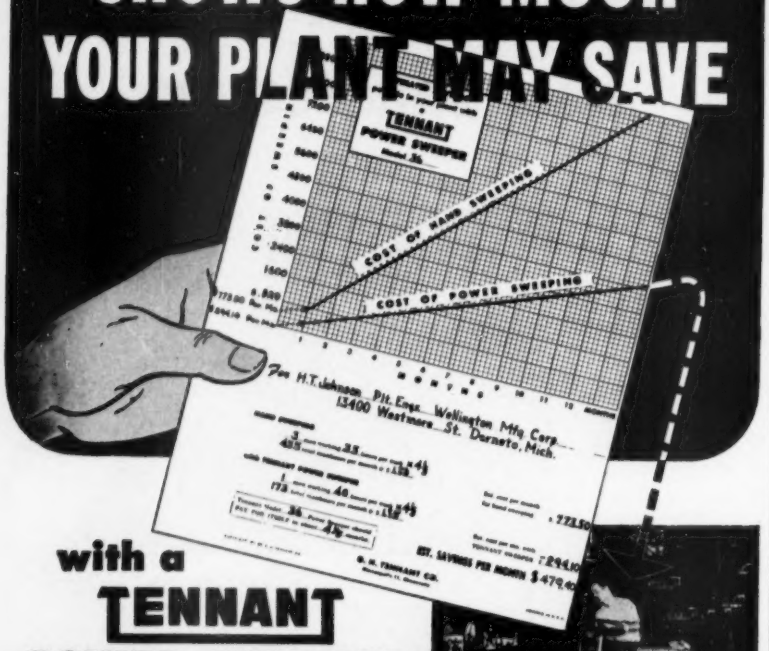
"Carboloy" is the trademark for the products of the Carboloy Department of General Electric Company

CARBOLOY CREATED-METALS

FIRST IN CREATED METALS FOR BETTER PRODUCTS

Yours for the asking! Free, accurate graph . . .

SHOWS HOW MUCH YOUR PLANT MAY SAVE



with a TENNANT POWER SWEEPER

How much do you actually pay for hand sweeping in your plant? And how much *could* a TENNANT Power Sweeper save you?

You'll get answers to these questions in a specially prepared *Cost-Savings Graph* like the one shown above.

It's a frank, conservative estimate of your plant's probable labor savings, based on a personal survey. It's attractive, carefully drawn, sensibly practical. And—it is *free;* no cost or obligation.

OFTEN REPLACES 3 to 12-MAN CREW

If yours is a typical plant, your graph will probably show that one TENNANT Power Sweeper could easily replace a crew of 3 to 12 men with push brooms . . . and would pay for itself in about 90 days or so. Most plants find their savings are in this range. Yours should be, too.

Why not get the facts in handy visual form? You *see*, month by month, the labor savings you'd make with a Tennant Sweeper. *Ask for your FREE GRAPH today.*

EXCLUSIVE FEATURES, such as instant reverse, automotive steering, make it easy to SAVE EXTRA TIME with a Tennant Sweeper. Gas or electric; various sizes.

HAS BIG SWEEPER CAPACITY but is small enough for narrow aisles. A NEW model; speed range 2-8 mph. Pays for itself fast.

Write today
FOR FULL DETAILS

TENNANT
Established 1870

G. H. TENNANT CO. 2554 N. 2nd Street Minneapolis 11, Minn.

Yes, without cost to us, please estimate our probable savings with a Tennant Sweeper; and send us free COST-SAVINGS GRAPH and details on ☐ Sweeper Bulletins; ☐ gas model; ☐ electric.

NAME_____

FIRM_____

ADDRESS_____

INDUSTRIAL FLOOR MACHINES

CREATORS OF THE TENNANT SYSTEM OF FLOOR MAINTENANCE—MANUFACTURERS OF EQUIPMENT AND MATERIALS FOR MAINTENANCE OF FLOORS, DECKS, ROOFS, HIGHWAYS

Offices in Principal Cities

PAINTS & PROTECTIVE COATINGS

Quick-Drying Latex Base Paint

A latex-base paint formulated to meet the needs of maintenance engineers is now available. It can be applied with brush, spray, or roller and dries in ½ hour, the maker claims.

Gives off no objectionable odor and presents no fire hazard. Will cover practically all previously painted surfaces with one coat.

It has a dead flat surface to eliminate surface glare.

The Glidden Co., Cleveland.

■

Insect Killing Paint

Kill-Kote is an oil-base flat paint containing an insecticide suspension.

One coat will give you protection against insects for years to come, the maker says. Washing with a mild detergent or soap increases the killing power of Kill-Kote.

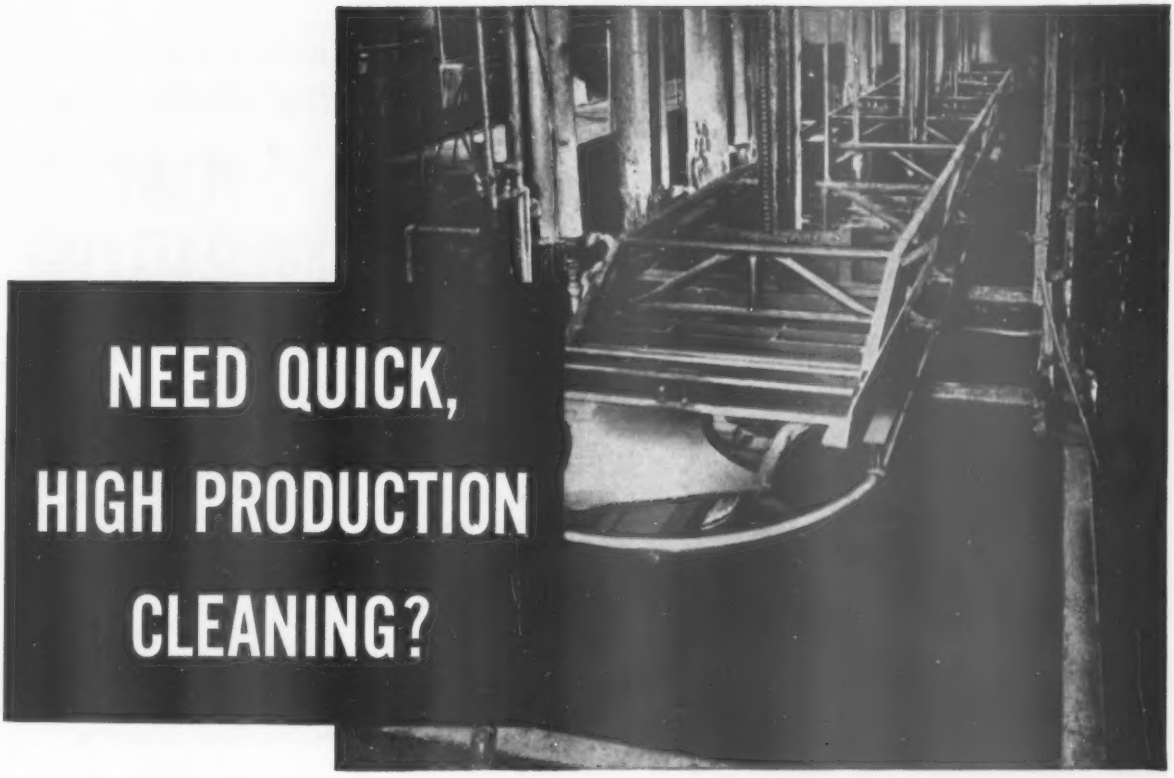
It can be applied with a brush or roller, or sprayed on.

Insecticide Paint Co., 2929 Fulton St., Brooklyn 7, N. Y.

■

SILICONE RESIN-BASED COATING provides maximum protection against corrosion when applied to surfaces subjected to high thermal conditions. It has a heat range up to and including 1500 F., says the maker, Rubber & Plastics Compound Co., Inc., 30 Rockefeller Plaza, New York 20. Also has good flexibility, adhesion, and outdoor weatherability.

Turn the page



METAL MOULDINGS CORPORATION OF DETROIT DOES IT AUTOMATICALLY

with UDYLITE EQUIPMENT!

"We had to have a FAST . . . yet SURE . . . method of cleaning our automotive stampings before plating. And these stampings are *really* intricate shapes. That's why we chose AUTOMATIC cleaning using a Udylite Full Automatic."

Yes, that's what the people of Metal Mouldings Corporation, Detroit, Michigan, told Udylite. They must combine a large volume of cleaning with no rejects. They found that Udylite equipment assured them of high production...while it saved time and manpower.

If you have cleaning problems . . . let the Udylite Corporation provide the answer. Your Udylite Technical Man will show you a faster, more economical, AUTOMATIC way to clean metal parts. Call him today or write direct for all the facts.

THE UDYLITE CORPORATION, DETROIT 11, MICHIGAN. *West of Rockies, L. H. Butcher Co., Los Angeles 23, California.*

PIONEER OF A BETTER WAY IN PLATING

THE Udylite CORPORATION
DETROIT 11, MICHIGAN

PLANT *Sanitation*

with SPENCER HARTFORD VACUUM

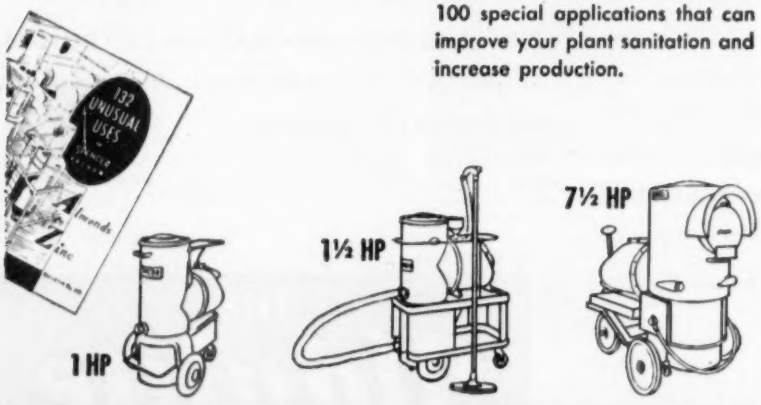
You can improve plant safety and sanitation by recommending Spencer Vacuum Equipment which will save its cost in a few months by increasing production and the quality of the product.

Take the job of handling hot materials, removing fly ash, picking up spilled liquids or handling fine chemical powders. Consider the time saved, the comfort and safety involved when these tasks are done with Spencer Vacuum.

Then consider that these Spencer machines will clean your plant and your machines at night—faster and at lower cost. That you can reclaim foods, chemicals, and metals, can speed up the assembly and inspection lines—in fact you can be sure that not only your plant, but your finished products are always clean.

Spencer representatives have special information on more than 100 special applications that can improve your plant sanitation and increase production.

Send for Bulletin No. 144 describing 132 unusual uses for Spencer Vacuum in industry.



THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

SPENCER HARTFORD

466-A

Begins on page 166

PLANT HOUSEKEEPING & SANITATION

Sweeper Has Fast, Mechanical Dumping

This power sweeper turns on a dime and can dump load weighing up to 700 pounds in 30 seconds.

Operated by one man, it drives like a car and covers a 36-in.-wide path, picking up dirt, litter, and dust. Travels at speeds up to 6 mph.

G. H. Tennant Co., 2554 N. Second St., Minneapolis 11.

■

NON-CLOGGING SOAP DISPENSER designed to deliver soap powder with a minimum of waste has been marketed by the DeWitt Co., 603 Addison St., Chicago. The Soapserver has a spring agitator to prevent packing of dispenser's contents. Soap is dispensed in a circular pattern on user's hands.

■

INSECTICIDE FOGGING UNIT powered by a 1-hp. motor and weighing 30 pounds has been marketed by Burlin & Co., 2939 Columbia Ave., Indianapolis 7. Can be skid- or wheel-mounted for greater portability. Gives off a penetrating fog that quickly kills insects.

Turn the page

PRODUCTION AND MORALE GET A *Quik-Lift* AT THE HAMER OIL TOOL COMPANY

"Production and worker morale have gone up noticeably since we installed Coffing Quik-Lift Electric Hoists," says Floyd S. Hamer, production manager of the Hamer Oil Tool Company, Long Beach, California.

This leading manufacturer of blind and plug valves finds that Quik-Lift Electric Hoists have more than measured up to expectations — both for their ability to *do* the job and to *stay on* the job. So successful were the first few units tried, in fact, that today there are 36 Quik-Lifts in one building alone.

Quik-Lifts are made to order for production work of this type. They are built to stand up under tough assembly-line use. Like Hamer, many have found that a Quik-Lift's dependability soon repays its cost in saved down time — and production and morale get a lift in the bargain.

For full information, and the name of your nearest distributor, write for Bulletin M9E.

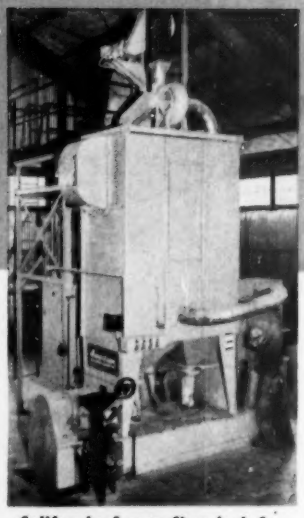
"Nobody lifts anything around here now." Today, all the heavy lifting is done by Coffing Quik-Lift Electric Hoists at the Hamer Oil Tool Company. Quik-Lifts are available in 17 sizes from 500 to 4,000 lb. and a choice of lifting speeds up to 49 ft. per. min.

COFFING HOIST COMPANY
Danville, Illinois

SOLD BY DISTRIBUTORS EVERYWHERE

repeat user—46 times

proves economy and dependability of DUSTUBE® collectors

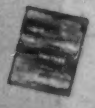


California Spray Chemical Co. STANDARDIZES on DUSTUBE COLLECTORS

Most everyone recognizes a repeat user as an indication of satisfactory service. Then, a repeat user—46 times—must be an indication of *outstanding* performance. The California Spray Chemical Corp., one of the leading manufacturers of insecticides, has adopted Dustube Collectors as standard equipment in portable insecticide dust plants all over the country. They have standardized on Dustubes because of their high efficiency, economical operation, dependable performance and economy of space required for installation. There is no dust loss in the mixing and manufacture of ultra fine ORTHO dusts and sprays.

The story is the same time after time . . . Dustube Collectors control dust more effectively, at lower cost. They remove dust with virtually 100% efficiency to make men and machines more efficient.

In spite of this high efficiency, Dustube Collectors cost less initially and are unusually economical to operate and maintain. Maintenance is limited to occasional tube inspection and replacement. Power costs are less than for other methods. As a result, Dustube Collectors give you more positive dust control for a lower capital outlay. In many cases, savings in operating costs quickly repay the cost of the installation. When you add the savings in salvaged materials and improved efficiency, you have an investment return too great to be ignored.



Why wait any longer . . . send for a copy of the Dustube Application Brochure today.

American WHEELABRATOR & EQUIPMENT CORP.

dustube® COLLECTORS

374 S. Byrkit St., Mishawaka, Ind.

PLANT HOUSEKEEPING & SANITATION

Begins on page 218

Packaged Water Conditioning Plant

These packaged water-conditioner plants are versatile and completely self-contained.

Without alterations they can be used to remove organic matter from water supplies, to chlorinate, to eliminate bad tastes and odors, to remove iron and manganese, to neutralize, to soften, and to de-alkalize.

Available in eight standard sizes ranging from 500 to 3300 gallons per hour.

The Permutit Co., 330 W. 42nd St., New York 36.

■

Flooring Resists Oils and Grease

Sylox is an oil- and grease-resistant flooring that can be applied over old surfaces of concrete and wood.

A type of oxychloride cement, it is proportioned and packaged at the factory to cover a pre-determined area at an average depth of ½ inch.

United Laboratories, Inc., 16801 Euclid Ave., Cleveland 12.

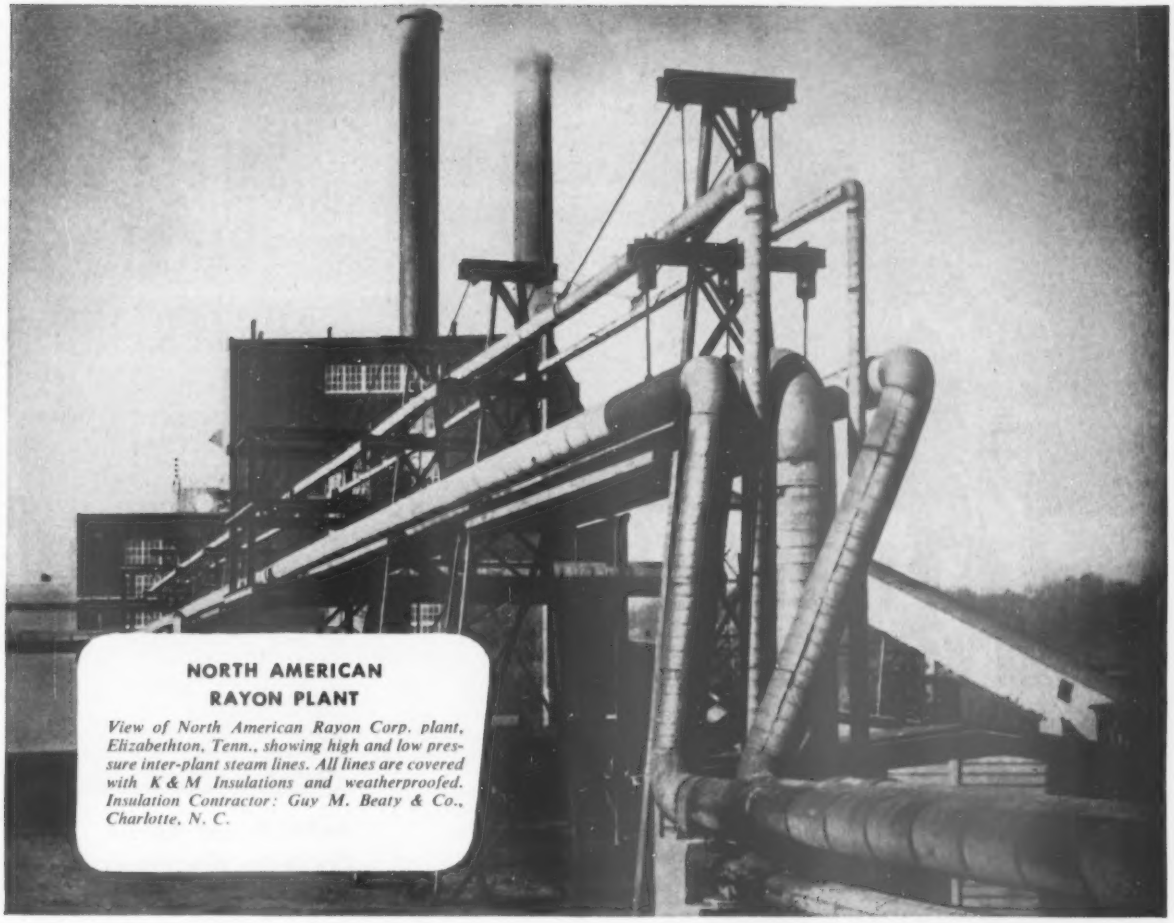
■

HEAVY-DUTY PORTABLE VACUUM CLEANER for industrial use has been marketed by the Premier Co., 755 Woodlawn Ave., St. Paul 1. Dry-tank capacity is 1¾ pecks; liquid capacity is 3¾ gallons. Comes furnished with many of the standard cleaning tool attachments.

■

MOBILE STEPLADDER for saving time and effort on out-of-reach jobs has been marketed by the Clyde W. Lint Co., 2323 W. 18th St., Chicago 8. When a maintenance worker steps on the ladder, the four swivel casters withdraw automatically into rubber cups that lock ladder to floor.

Turn the page



NORTH AMERICAN RAYON PLANT

View of North American Rayon Corp. plant, Elizabethton, Tenn., showing high and low pressure inter-plant steam lines. All lines are covered with K & M Insulations and weatherproofed. Insulation Contractor: Guy M. Beaty & Co., Charlotte, N. C.

Steam takes weather in stride
– under K&M Insulations!

THE steam lines pictured above run more than 2000 feet in the open air—exposed daily to sun, rain, and constant air-temperature change. Yet, because of efficient K&M Insulations, the steam travels these lines with minimum temperature loss. To the plant owners, that means power saved, money saved!

The two products that keep this heat within bounds are K&M Hy-Temp Insulation and "Featherweight" 85% Magnesia. Hy-Temp (diatomaceous silica) has exceptional heat-resisting qualities, and is put directly on the hot surface. A sufficient thickness brings its outside surface temperature to 600°F. or lower.

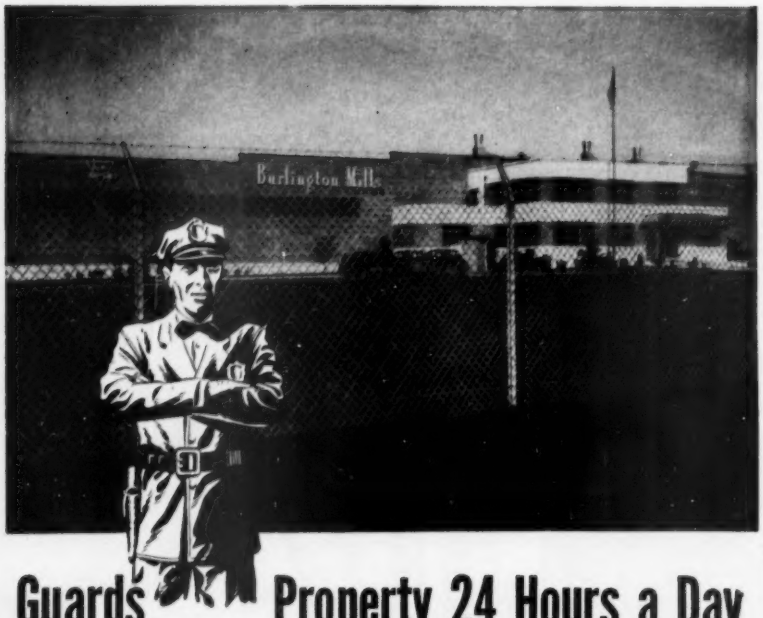
"Featherweight" 85% Magnesia, a superb insulator, is used as the second layer; and its surface may then be covered and painted, or weatherproofed for outdoor service, as in the illustration above.

K&M Hy-Temp and "Featherweight" in combination are effective on applications up to 1909° F. Two separate layers of insulation with vertical and horizontal staggered joints eliminate heat loss which occurs when expansion of hot piping and equipment causes joints to open in single layer installations. Both materials are made in a variety of sizes, shapes, and thicknesses to suit any application.

Your K&M Distributor is an experienced applicator who will gladly tell you more about these products. Or write directly to us.

KEASBEY & MATTISON
COMPANY • AMBLER • PENNSYLVANIA

Nature made Asbestos... Keasbey & Mattison has made it serve mankind since 1873



Guards Property 24 Hours a Day in All Weather, Year after Year!

that's why you should install

Anchor Fence

YOU get three immediate and important benefits as soon as you have Anchor Fence erected around your plant. First of all, your Anchor Fence will keep trespassers, agitators, and vandals *outside* your grounds.

Equally important, your Anchor Fence will protect your materials and various supplies stored in the open.

Finally, your Anchor Fence will help you control plant and vehicular traffic with maximum efficiency and economy.

But, be sure you get genuine Anchor Fence. *There are imitators!* So, look for the orange-and-black identification plate that *only* Anchor Fence may carry. That plate is your guarantee of the finest in industrial fencing.

* * *

FOR ADDITIONAL INFORMATION send for Anchor's fact-packed Industrial Fence Catalog. Or ask to have one of our experienced engineers submit recommendations . . . without obligation, of course. Write: ANCHOR POST PRODUCTS, INC., 6620 Eastern Ave., Baltimore 24, Maryland.

Anchor Fence

Division of Anchor Post Products, Inc.

Begins on page 166

SAFETY & PLANT PROTECTION

Bullet-Proof Apron Protects Machinists

A bullet-proof apron, light as a sport jacket, to protect machinists from flying metal particles has been marketed.

Made of glass-coated cloth, the apron is capable of stopping a .38-caliber bullet fired from 8 feet. Weighs less than 3 pounds.

B. F. McDonald Co., Los Angeles.

■

Portable Radiation Exposure Shield

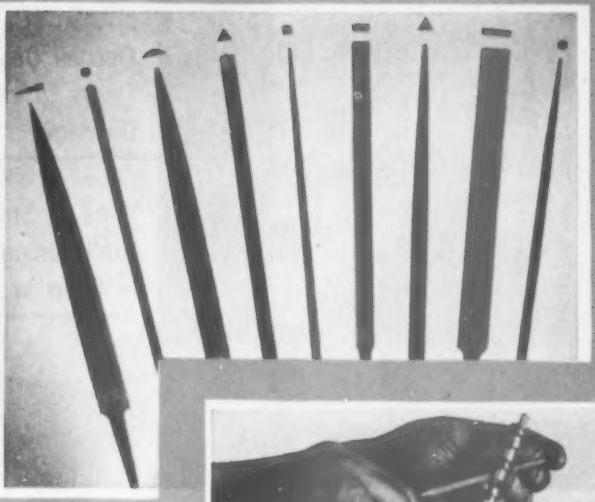
A portable directional exposure shield for the safe handling of strong sources of Cobalt 60 used in industrial radiography is now available.

Will shield the radiographer from all radiation from a gamma source except a beam. The shield eliminates the need for a specially constructed room.

Technical Operations Inc., 6 Schouler Ct., Arlington, Mass.

Turn the page

For those close-tolerance filing jobs...
Nicholson TRADE X.F. MARK Swiss Pattern Files



"WHEN it's got to be *right*, you've got to be *sure*." That's one of the creeds of the tool, die, model and fine-instrument crafts. One rule toward achieving accuracy in precision work is to use tools which in themselves are correct and of the highest efficiency.

For true fits and fine finishes there can be no compromise on file quality, no equivocating on file cost. Nicholson recognizes this principle, and puts "everything it's got" into putting excellence into X.F. (meaning *E*xtra *F*ine) Swiss Patterns. The shaping, cutting, hardening and finishing of these special file types is in the hands of specialists who work on nothing else.

Nicholson X.F. Swiss Patterns differ from American (regular) Pattern files. They are relatively smaller and finer in cut. Tapers are longer and more pointed. Cross sections are more varied. Individual types include those shown above (left to right)—Knife, Round Straight, Half Round, Metal Saw, Square, Pillar Narrow, Three Square, Equaling, Round Tapered. Others: Hand, Warding, Crochet, Barrette, Slitting, Crossing, Corrugating, Joint, Pippin, Testing. Group assortments: Die Sinkers, Die Sinkers Rifflers, Filing Machine, Broach, Round and Square Handle Needle (in 1-doz. plastic-case assortments if desired).

SOLD THROUGH INDUSTRIAL DISTRIBUTORS

NICHOLSON X U.S.A.

NICHOLSON FILE COMPANY
27 Acorn St., Providence 1, R. I.

BLACK DIAMOND MADE IN U.S.A.

(In Canada: Nicholson File Company of Canada Ltd., Port Hope, Ontario)

NICHOLSON FILES *FOR EVERY PURPOSE*

No Overhead Space Lost

No Wall Space Lost

Opened Door Clears Entire Doorway

Wind or Storm Can't Damage Doors — Open or Closed!

because they're

Kinnear Steel Rolling Doors

You can see some of the many advantages Kinnear Rolling Doors bring to all types of service opening in this warehouse installation.

Coiling compactly above the lintel, Kinnear Rolling Doors *never get in the way of the overhead conveyor.* And since they need no wall space for either storage or operation, posts, walls, windows or other doors can be placed flush with the door jambs on both sides of the opening.

These and other space-saving conveniences are in addition to the long-wearing ruggedness, fire resistance, and protection of Kinnear's interlocking steel-slat curtain. Their coiling action is also ideal for motorized, push-button control.

Kinnear Steel Rolling Doors are built to fit opening of any size, in any building, old or new. Write today for full information.

KINNEAR ROLLING DOORS
Saving Ways in Doorways

The Kinnear Manufacturing Co.
Factories:
1540-60 Fields Avenue, Columbus 16, Ohio
1742 Yosemite Ave., San Francisco 24, Calif.
Offices & Agents in All Principal Cities

Begins on page 166

VALVES & FITTINGS

Extruded Plastic Pipe and Tubing

Many sizes of pipe and tubing and a full line of fittings are being made of extruded unplasticized polyvinyl chloride.

The pipes and tubes are hard, tough, and rigid, with outstanding chemical resistance. Pipe is available in 10- and 20-ft. lengths in both standard and extra-heavy weights, from ½- to 4-in. nominal pipe size.

Alpha Plastics, Inc., 14 Northfield Rd., West Orange, N. J.

■

Water-Cooled Aftercooler

A water-cooled aftercooler has been designed for removing oil and moisture from compressed-air systems.

The aftercooler has longitudinal inner-fins that permit maximum heat transfer with minimum pressure drop, the maker says.

Made of copper and brass for high corrosion resistance and long life. The tube bundle is easily removed for cleaning and replacement. Size range from 100 to 500 cfm.

Heat-X-Changer Co., Brewster, N. Y.

Turn the page

SO SIMPLE

NO PINS • NO PIVOTS • NO BEARINGS

No Wonder There's No Trouble

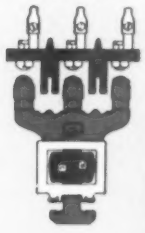
In any device it's the moving parts that are the troublemakers. The more moving parts . . . the more chances for trouble.

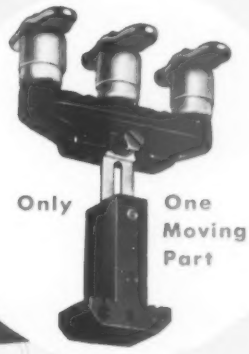
Most motor starters have lots of moving parts like pins, pivots, bearings, and linkages. But . . . Allen-Bradley Bulletin 709 solenoid starters and contactors have ONLY ONE MOVING PART . . . the solenoid plunger which carries the movable contacts. No switch could be simpler . . . nor more trouble free. The silver alloy contacts need no filing or dressing. They are always in good operating condition.

The Bulletin 709 general purpose enclosures, shown below, have a bonderized, black enamel exterior finish that is corrosion resistant. The white interiors make installation and inspection easy in dark places. All switch parts have a "quality" finish. In fact, you cannot buy better "quality looking" control.

Special enclosures are available for every kind of service condition. These across-the-line starters can also be furnished in "open type," without enclosures, for mounting in machine base. Let us send you our catalog!

CONTACTOR OPEN





CONTACTOR CLOSED

Send for Illustrated Bulletin

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

COMPLETE LINE

Allen-Bradley Bulletin 709 Across-the-line Starters are listed for 3-phase motors up to 600 hp, 440-550 v. All starters have accurate relays for overload protection.

ALLEN-BRADLEY

TROUBLE FREE MOTOR CONTROLS

7-53-MR

Bulletin 646 Manual Autotransformer Type Starter

LOOK! Air Break Contacts for Motors up to 150 hp, 440-550 v

When you buy a manually operated autotransformer starter, don't overlook these advantages of the Allen-Bradley Bulletin 646 Starter:

In addition to time-delay switchover and dependable overload relays, the Bulletin 646 Starter is listed with *air break contacts* for ratings up to 75 hp, 220 v; 150 hp, 440-550 v. Oil is messy and should be used only where atmospheric conditions require it. These starters can be furnished with oil-immersed contacts, if desired.

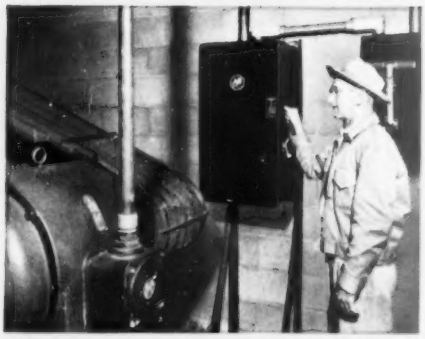
Allen-Bradley double break, silver alloy contacts need no cleaning, filing, or dressing. This saves labor and lengthens contact life. Starting voltage taps are easily adjusted to suit starting conditions. Time delay undervoltage release is optional.

Bulletin 646 autotransformer type starters are available in NEMA Type 1, Type 4, and Type 9 enclosures. For full details write for Bulletin 646, a 12-page booklet with dimensions and ratings up to 250 hp, 440-550 volts.

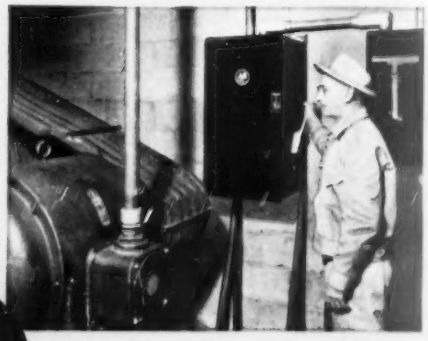
Allen-Bradley Co. 1316 S. Second St., Milwaukee 4, Wis.

ALLEN-BRADLEY

TROUBLE FREE MOTOR CONTROLS



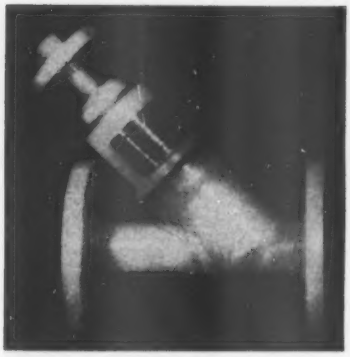
To start motor, operating lever is pulled into START position. Built-in automatic time delay prevents operator from immediately throwing lever to RUN position.



After motor accelerates, the time-delay trips. Operator can then . . . but not before . . . push lever into RUN position. If operator shifts too soon, operating lever must be returned to START.

7-53-M

Begins on page 224



Plastic Valves Resist Corrosion

Corrosion - resistant plastic globe and "Y" valves will withstand the action of most acids as well as a variety of caustic solutions.

Constructed entirely of polyethylene, they can be used for working pressures up to 50 psi. and temperatures to 150 F.

A sealing diaphragm of polyethylene-polyisobutylene mixture insures resilience and drop-tightness, the maker says.

Vanton Pump Corp., Empire State Bldg., New York.

■

VEE - SEAL PRESSURE - RESPONSIVE PACKING made of Kelon-T (Teflon) for valve stems, hydraulic cylinders, jacks, lifts, and pumps is now available from W.S. Shamban & Co., 11617 W. Jefferson Blvd., Culver City, Calif. Equipment using this packing will not "freeze," even if inoperative for long periods of time, the manufacturer claims.

■

HOSE FOR HANDLING LPG (liquefied petroleum gas) combines layers of horizontally braided steel wire with rayon cord reinforcements. Produced by the Quaker Rubber Corp., Philadelphia. Each length has two separate static wires, interlaced with the reinforcing braids, to insure full static conductivity.

Turn the page

You'll saw MORE METAL FASTER and STRAIGHTER

with a **MILFORD**
ALL-HARD
REZISTOR
POWER BLADE

and here's why . . .

BLADE IS STRAIGHT, FLAT . . .
without dish or bow, and . . . a blade must be straight to cut straight.

TEETH ARE SHARP . . .
Milford "Multiple-Pass" Milling assures sharper, more uniform teeth with smoother gullets, and it takes a sharp saw to cut really clean and fast.

PRECISION SET . . .
Side-to-side tolerance and overall set is held to close limits. Only an accurately set blade can saw straight and operate smoothly.

M-2 HIGH SPEED STEEL . . .
This is the most modern analysis of red hardness saw steel and combines full hardness with unusual toughness.

EXPERT HEAT TREATING . . .
gives a high Rockwell hardness that means a longer blade life cutting harder metals . . . plus a fine grain structure that prevents tooth chipping or crumbling under pressure.

—BUT DON'T TAKE OUR WORD
that you can't buy a better blade anywhere than a MILFORD All-Hard REZISTOR. TRY ONE on your own tough jobs in your own shop and SEE FOR YOURSELF!

STANDARD OF QUALITY THE WORLD OVER
THE HENRY G. THOMPSON & SON CO.
SAW BLADE SPECIALISTS FOR OVER 75 YEARS
NEW HAVEN 5, CONNECTICUT
PROFILE BLADES AND BAND SAW BLADES
HAND AND POWER HACK SAW BLADES

Sold through MILFORD Distributors who render a service tailored to your needs. The industrial distributor is familiar with the requirements of industrial users in his area. His is a prompt personalized service, as near as your telephone.

with KEX wiping towels...

Because Every Square Inch is Usable—and KEX Industrial Wiping Towel Rental Service...

- Is more economical
- Supplies towels that are safe to use
- Simplifies handling
- Saves man hours
- Better equips our men
- Relieves me of shopping around
- Is a national service I can depend on
- Is available to *all* my plants

For complete information see your Classified Telephone Directory for nearest Kex distributor, or write Kex National Service, 295 Fifth Avenue, New York 16, N. Y.

"KEX" NATIONAL SERVICE

REG. U.S. PAT. OFF.

It isn't Kex unless it's imprinted with the Kex name

MISCELLANEOUS

Food Cart Saves Time and Avoids Confusion

Here's an in-plant coffee and food serving cart that can save you time and money. It brings the rest-period snack to the worker at his machine.

Made of stainless steel, the carts are available with or without heating elements in the food compartments. Although primarily designed for "time-out" snacks, the cart can also be used for lunch-hour service.

Anetsberger Bros., 179 N. Anets Dr., Northbrook, Ill.

■

Multi-Purpose Building Panel

A building panel made in lengths up to 33 feet for use in floors, ceiling, or roofs has been marketed. It is called Fenestra double-hat "D."

The panels interlock quickly and easily to form a combination ceiling and roof. Then they are spot-welded to supporting structural beams or bearing walls to complete instalation.

Detroit Steel Products Co., 2250 E. Grand Blvd, Detroit 11.

Turn the page

Save Time

When time is critical, when time is valuable, you save time by relying on your nearest Westinghouse Electronic Tube Distributor.

Each Distributor handling Westinghouse Electronic Tubes is expert at getting the right tube to the right place in the least time. Your distributor and his experienced salesmen can save you time that is vital on your job—and more vital to your production.

Rely on your Westinghouse distributor salesman. He is backed by the full resources of the Westinghouse Electronic Tube Division. He protects you with an assured source of highest quality tubes.

Ask your Westinghouse distributor for details of "The Personalized Inventory Plan" which assures your tube replacements when you need them. For the name of your Westinghouse Electronic Tube distributor, write Dept. F-109 at the address below.

ET-95034

YOU CAN BE SURE...IF IT'S Westinghouse

RELIATRON™ TUBES

WESTINGHOUSE ELECTRIC CORPORATION, ELECTRONIC TUBE DIVISION, ELMIRA, N. Y.

HOT
OFF THE PRESS
and

1953 Edition

Mall

PNEUMATIC TOOL CATALOG

Yours free—the new, info-packed MALL catalog showing the very latest pneumatic tools available. It's a MUST for your reference file. Send for it today and get all the facts about the world-famous MALL line of completely modern pneumatic production tools . . . a size and style for every need.

Get Your FREE COPY NOW!

MU-23

MALL TOOL COMPANY
7710 S. Chicago Ave. Chicago 19, Ill.

RUSH me a free copy of the 1953 MALL Pneumatic Tool catalog.

Name_____

Firm_____

Address_____

MISCELLANEOUS EQUIPMENT

Begins on page 226

Versatile Steel Framing

Versabar is a versatile structural steel framing member being manufactured in four basic sizes.

Made from cold-rolled carbon steel, it can be used for racks, pipe supports, conduit supports, and concrete inserts. For assembly only a hacksaw and wrench are needed.

The assembled racks have the strength of welded steel units, yet can be easily taken apart and re-used, manufacturer claims. This will save you money when storage requirements change.

M-H Standard Co., 515 Communipaw Ave., Jersey City 4, N. J.

■

Insulated Metal Panel for Curtain Walls

Insulated metal wall panels designed for economical curtain wall construction have been announced.

The lightweight panels are available in galvanized or painted steel, aluminum, or stainless, flush or fluted. Factory assembled, with a core of fibrous glass insulation, they are ready for field erection.

The panels can be installed either horizontally or vertically, maker says.

Steelcraft Manufacturing Co., Rossmoyne, Ohio.

■

Flexible Table for Cafeterias

These tables are designed to give the advantages of a rolling, folding table and the permanence of rigid seating equipment.

Combination table and bench will seat 16 people. When not in use it can be folded up and stored in a small space, the maker says.

All-welded construction, with 4-in. rubber casters.

Seating, Inc., Minneapolis.

WHERE TO BUY

Featuring additional products, specialties & services for manufacturing plants

Pipe Repair CLAMPS

Made for every type of leak—any temperature or pressure. Send for Catalog No. 41-O.

M. B. SKINNER CO., SOUTH BEND 21, INDIANA

STOP that WATER

With FORMULA NO. 640, a clear liquid which penetrates 1" plus in concrete, brick, stucco, plaster, etc. Seals out water, dirt. Holds 20' head. Use outside and in. Preserves all absorbent materials. Sold 14 years. Quick, economical, sure. $3 in 55's. Free sample. See Sweet's.
HAYNES PRODUCTS CO., OMAHA 3, NEBR.

FLUX FOR SODERING

SILVER SODERING
BRAZING
WELDING

L. B. ALLEN CO., INC.
6781 BRYN MAWR AVE., CHICAGO 31, ILL.

STOP DUST

DUSTKOPS — **22 Models**
UNIT TYPE — 300 cfm to 10,000 cfm
LOW COST — ¼ hp to 15 hp

AVAILABLE FROM STOCK

For: Grinders, buffers, polishers, woodworking, lint . . . ALL DUSTS

Send for Cat. 605t; describe problem for recommendation by return mail, without obligation

AGET-DETROIT CO. • ANN ARBOR, MICH.

FLUXES for SODERING BRAZING WELDING

AT IT SINCE '93

ALLEN

Send for Samples

L. B. ALLEN CO., INC.
6781 Bryn Mawr, Chicago 31, Ill.

Cities Service Cutting Oils Proved The Very Best By Micrometer Test!

CUTTER MEASURED WITH MICROMETER. As a final test, Automatic Pencil Sharpener measures each cutter with a micrometer. All tests proved that Cities Service cutting oil was absolutely tops for this really tough job.

STRICT SPECIFICATIONS REQUIRE FINEST CUTTING OIL. APSCO Sharpeners offer many more features than other brands. To produce their top quality product, Spengler-Loomis relies on top-quality lubrication products . . . Cities Service Products, famous throughout industry.

ONLY .005 INCHES BURR OR BUILD-UP ALLOWED IN FIFTY-HOUR OPERATION CUTTING GROOVE IN B1112 STEEL!

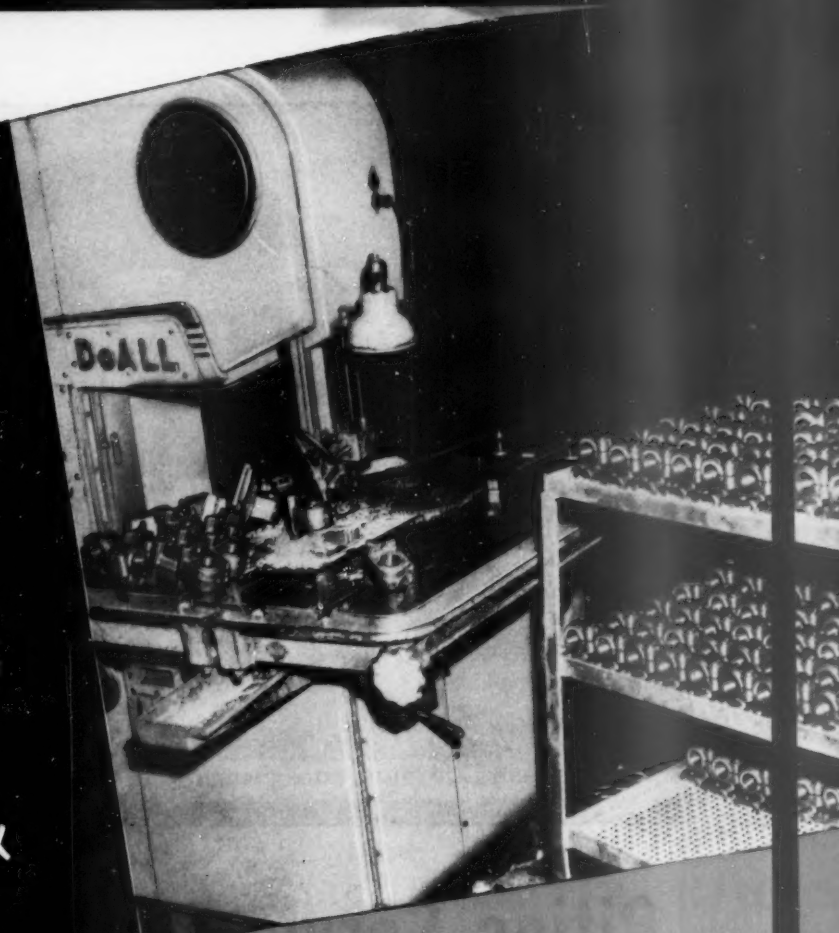
Says Mr. C. J. Kostrzewa, Plant Superintendent: "Cutting oil requirements in our Automatic Pencil Sharpener Division are tough. To find the right coolant, we called for, and tested, samples from various companies. Over a period of testing time, we used graphs, charts and tables, keeping a running record on all coolants. As a final test, we measured the cutter with a micrometer before and after milling. The cutting oil that came out tops was Cities Service.

"I'd also like to point out that the Cities Service Engineering staff co-operated fully by offering helpful advice and excellent service."

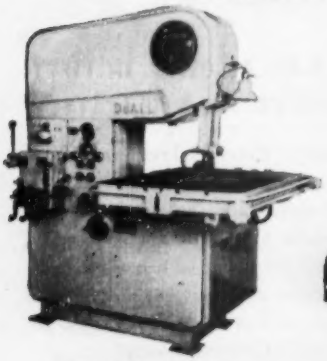
Why not discuss your lubrication problems with a Cities Service lubrication engineer? Write Cities Service Oil Company, Dept. 128, Sixty Wall Tower, New York 5, New York—or contact your nearest Cities Service office.

CITIES SERVICE
QUALITY PETROLEUM PRODUCTS

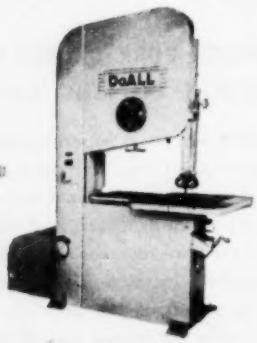
The Band Machine is as Basic as the Lathe ... for production Work



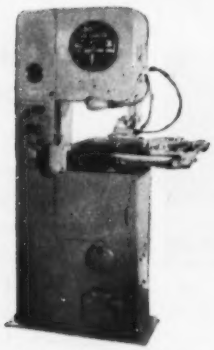
A BAND MACHINE FOR EVERY REQUIREMENT



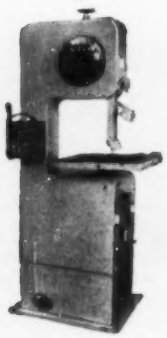
DoALL CONTOUR-MATIC — hydraulic operation. 40 to 10,000 blade feet per minute.



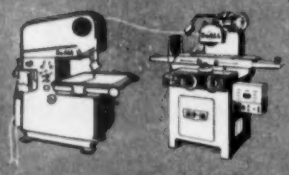
DoALL ZEPHYR — up to 15,000 feet per minute. 16" to 60" throat capacity.



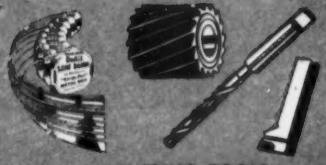
DoALL CONTOUR — an all around machine for precision work.



DoALL UTILITY — low cost handyman for big and small shops.

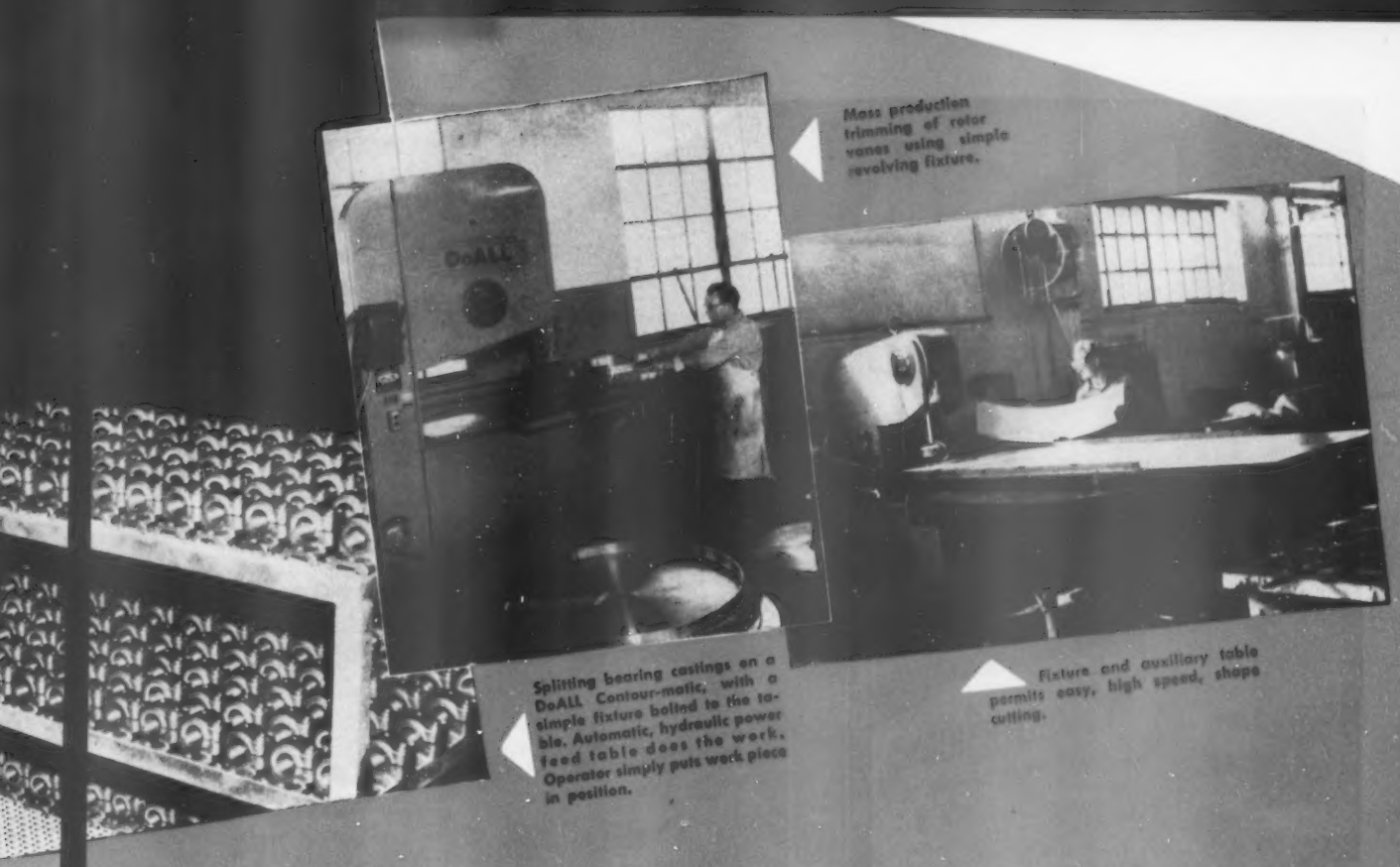


MACHINE TOOLS



CUTTING TOOLS

GAGING EQUIPMENT


Mass production trimming of rotor vanes using simple revolving fixture.
Splitting bearing castings on a DoALL Contour-matic, with a simple fixture bolted to the table. Automatic, hydraulic power feed table does the work. Operator simply puts work piece in position.
Fixture and auxiliary table permits easy, high speed, shape cutting.

MASS PRODUCTION BAND MACHINING IS A MATTER OF SIMPLE FIXTURES

PRODUCTION costs are highly dependent on methods. Mass production band machining is a work method that has cut costs in hundreds of plants and very possibly can in yours. Slitting—slotting—stock removal prior to milling, shaping, turning and other operations—contour sawing to final shape and many other jobs can be performed almost automatically on DoALL machines with proper fixtures.

The above illustrations show three typical applications of production bandsawing. The opportunities are limited only by the ingenuity of the user.

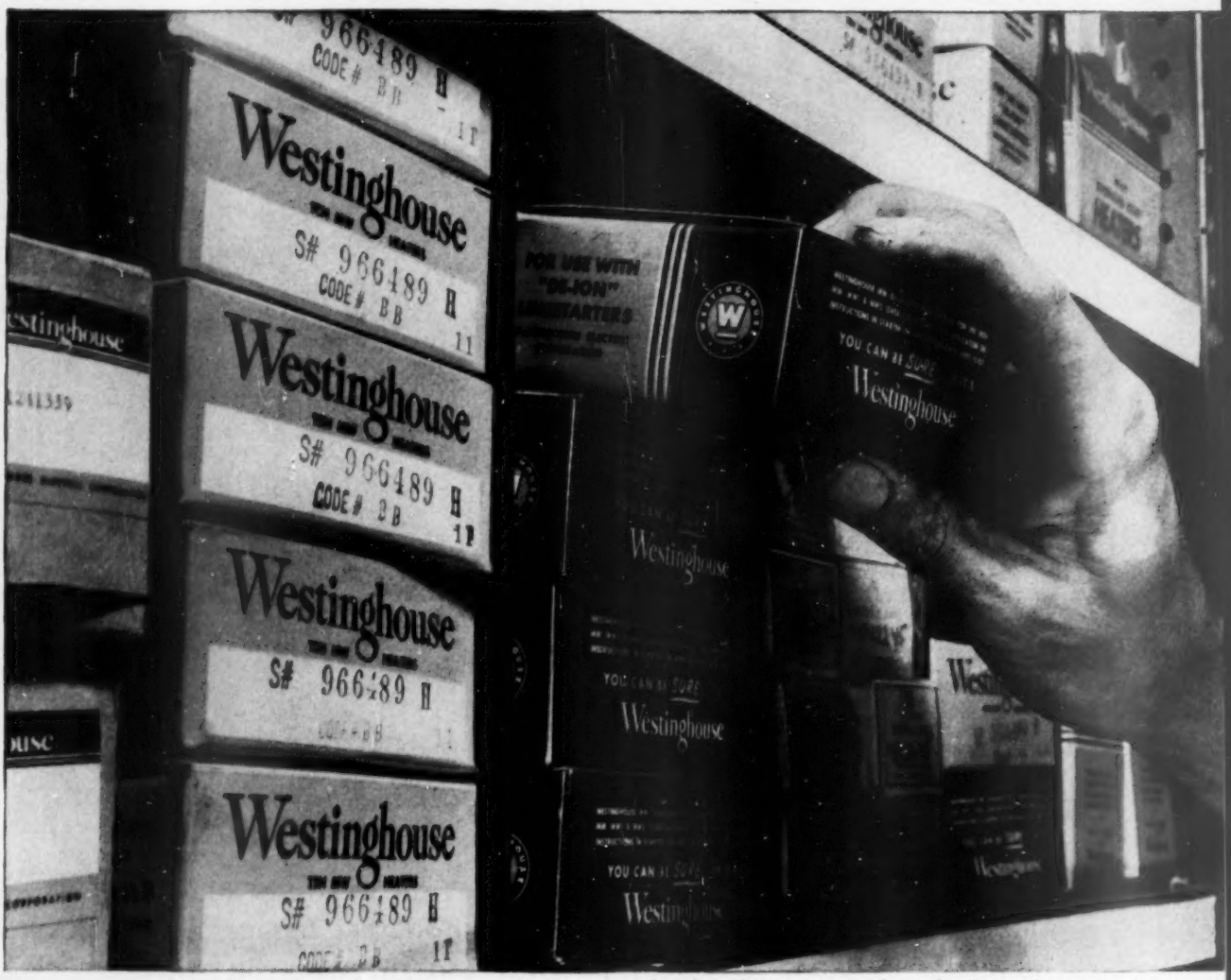
To lower costs, investigate bandsawing. ASK FOR LITERATURE. Call your local DoALL Sales-Service Store, or write:

B-19

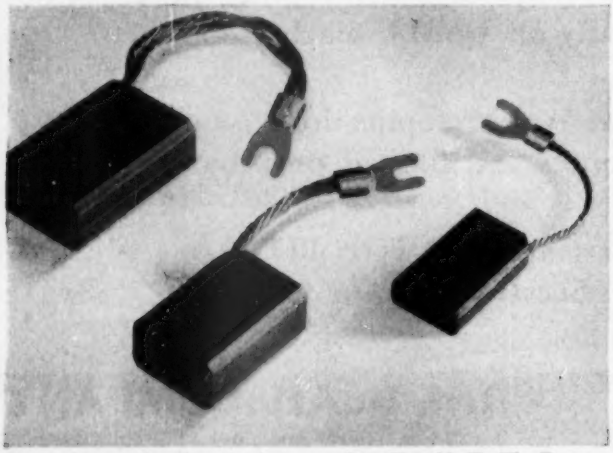
THE DoALL COMPANY
254 N. Laurel Ave., Des Plaines, Illinois

DoALL

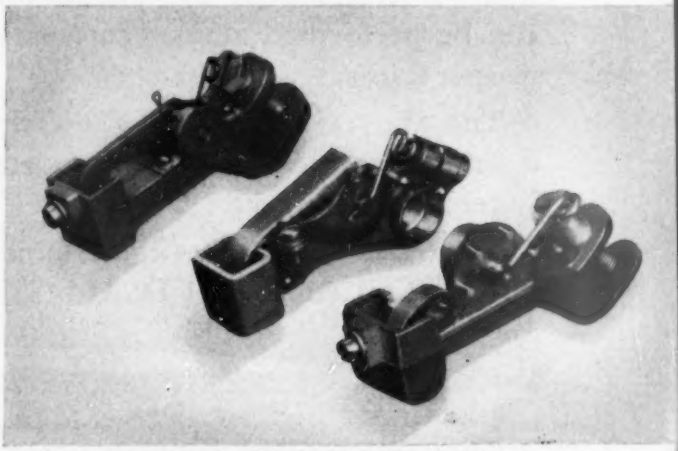
INDUSTRIAL SUPPLIES



Keep your own stock of Westinghouse Genuine Renewal Parts. At finger-tip reach you can replace worn parts fast...thus reducing costly downtime. Each Westinghouse Renewal Part is clearly numbered, so that no error can be made when ordering the right part. Be prepared . . . keep the right renewal parts in stock . . . parts that are made by Westinghouse, for Westinghouse equipment.



Westinghouse Brushes also help you Beat Trouble To The Draw. These brushes are manufactured for Westinghouse Motors. They wear better and longer. They improve commutation. They reduce sparking. Keep your motors in operation longer by using nothing but Westinghouse Brushes in Westinghouse Motors.



When you buy Genuine Westinghouse Renewal Parts, you get the benefit of constant research improvements. Shown above are two old-style Westinghouse Brushholders and, below them, a later model which has a number of important design improvements. Another great advantage of Westinghouse Renewal Parts:

How to beat trouble to the draw

Having the *right renewal parts* available for replacing worn electrical parts cures a lot of maintenance headaches. Westinghouse Renewal Parts are *made* for Westinghouse equipment, therefore, they *fit* Westinghouse equipment far better than any makeshift or substitute.

Westinghouse Renewal Parts incorporate the most recent research improvements . . . often resulting in even better operation than formerly. Danger from using imitations is removed . . . instead you get exactly the tolerance, proper size and high quality you need for dependable operation of your Westinghouse equipment. You save cost, downtime, repair bills and man power.

This is the kind of backup and reliable parts service that makes your choice of Westinghouse products logical, practical and economical.

You will have no problem ordering the right renewal part for your apparatus. Westinghouse gives you fast delivery from strategically located warehouses throughout the country. Fast delivery from stock in 46 locations enables you to keep low parts inventories at your plant.

Westinghouse also maintains 36 Repair Plants where all kinds of electrical apparatus is repaired . . . and 46 Field Service Offices to make inspections, adjustments and on-the-spot repairs for equipment that cannot be moved easily.

Don't gamble . . . keep the quality that was originally put into your Westinghouse apparatus by using Genuine Westinghouse Renewal Parts, and the whole scope of Westinghouse Maintenance Service.

Westinghouse Electric Corporation, Maintenance Sales Department, East Pittsburgh, Pennsylvania. J-95163

YOU CAN BE SURE...IF IT'S Westinghouse

If you want "Thru-the-Air" handling at its low-cost best, you can't beat this — a *genuine* P&H Zip-Lift Electric Hoist with rope control . . . only $199.50.

This new "Zip" is built to give you years of trouble-free service — *guaranteed* to withstand an occasional overload up to 25% more than the rated capacity. Other important advantages include real wire rope hoisting for wider side pull, double brakes for double safety, and easy installation (just hang it up and plug it in).

Yes, here's the number-one buy in the low-cost hoist field — the new Zip-Lift ready to save time and money for you. Check the many ways "Thru-the-Air" handling can cut your *costs*. Ask your nearby P&H Dealer to give your plant the once-over. His advice will cost you nothing — and he will save you money. Call him today!

Also available with full-magnetic push button control

handle it "THRU THE AIR" with

P&H ZIP-LIFT

P&H ELECTRIC HOIST DIVISION

HARNISCHFEGER CORPORATION

MILWAUKEE 46, WISCONSIN

the [redacted] *Line*

TRUCK CRANES · DIESEL ENGINES · POWER SHOVELS · PREFABRICATED HOMES · ELECTRIC HOISTS · SOIL STABILIZERS · WELDING EQUIPMENT · OVERHEAD CRANES

CLEAN-UP CHARLIE WINS ALL THE PRIZES FOR NEATNESS.

The Fine Art of Goldbricking

If you've found an effective way to deal with any of these characters in your plant except firing 'em, why not let FACTORY's editor know about it?

By PAUL LOCKWOOD
Richmond, Calif.

SOME PEOPLE are tired; some people are overworked; some people are lazy. And some people are just plain goldbrickers.

First glance at the shirking worker may peg him as tired or overworked. Closer examination may lead the industrial relations director to classify him as lazy. But when this classification is found inadequate, he is tagged as a goldbricker—a title he well deserves.

Once in a while an industrial relations director will discover a way to get the goldbricker to kick the gold dust off his feet and get back into production. At other times the only solution left is an empty time-card slot.

What to do? I offer no panacea. All I know is, you have to handle each case individually.

And first you have to catch your goldbricker. Which explains these thumbnail sketches of typical practitioners of the ancient art. They'll help you spot your man.

WASHROOM WILLIE • Willie may leave his machine for a smoke, a coke, to catch up on the latest plant gossip, win a buck in a dice game, make a bet with the plant bookie—or for countless other reasons.

Of course these are the *real* reasons for leaving his machine. But Willie has an excuse to match every one—*the washroom.*

Goldbrickers long ago discovered that the washroom was one place where they could avoid de-

GOLDBRICKING

Begins on page 235

tection most of the time. So that is where Willie and his like spend a lot of their time.

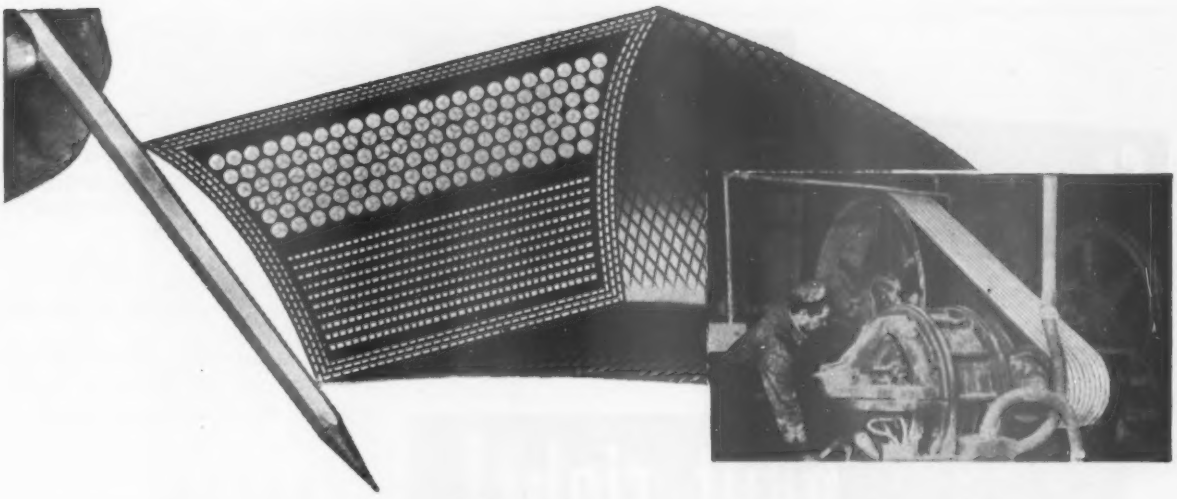
One industrial relations director conceived the idea of having a special time-card system for the washroom—but he thought better of it. He was afraid his next union contract would have a clause prohibiting use of the system. Or he might even have a new union of washroom timekeepers to deal with.

Many times Willie is not spotted as a goldbricker. Industrial relations directors touring the plant get used to seeing him in the washroom and figure it is his assignment.

That might not be such a bad way to break him of his goldbricking technique. At least he would be on the job.

EFFICIENT EVERETT · Like everyone with an exacting temperament, Everett simply cannot work unless his machine is absolutely perfect. Keeping it adjusted is a constant chore, but Everett sticks at the job. He adjusts this, moves that, and then tests his precision work. Then he makes some more adjustments—to get his machine *perfect*.

By the time Everett has it really adjusted and ready to go, it's time for lunch. Then there's an

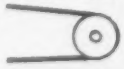


Gates V-Belts are built with CONCAVE SIDES

(U.S. PATENT NO. 1813698)

...that's why they last longer!

If you want lower V-Belt costs, just make this simple test...pick up *any* V-Belt and bend it as if it were going around a pulley.



As the belt bends, grip its sides between your fingers and thumb.

If the belt has *straight sides* you feel the sides bulge out. This forces the sides of the belt to press *unevenly* against the V-pulley . . . and you get concentrated wear at the points shown by the arrows.

Now, try this same test with the V-Belt that is built with CONCAVE SIDES **—the Gates Vulco Rope.**

As this belt bends, you can feel the CONCAVE SIDES *fill out* and become perfectly straight.

These sides press *evenly* against the V-pulley. All wear is distributed *uniformly* across the full width of the Gates Vulco Rope and the CONCAVE SIDES therefore mean longer belt life and lower V-Belt costs for you.

When you buy V-Belts, be sure to get the V-Belt with the CONCAVE SIDES—the Gates Vulco Rope!

Gates Engineering Offices and Jobber Stocks are located in all industrial centers of the United States and in 71 foreign countries.

CS-935

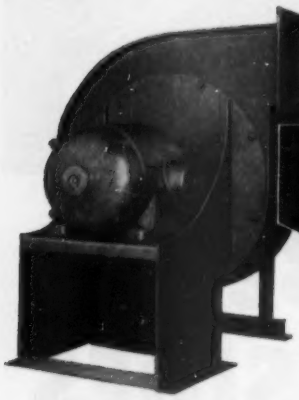
V-Belts—Hose
Molded Rubber Goods
for industry
World's Largest Maker
of V-Belts

Gates® VULCO ROPE DRIVES

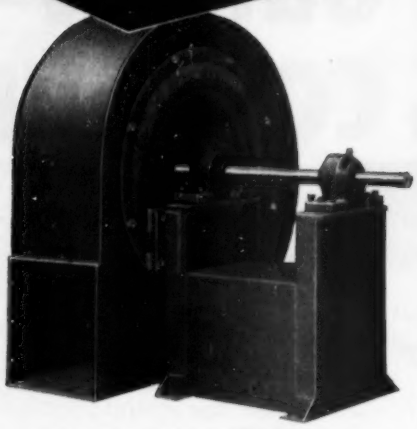
THE GATES RUBBER COMPANY • DENVER, U.S.A.

figured right!

built right!



TYPE O BLOWERS — for supplying air at high pressures. Wide range of sizes to meet almost any capacity and operating speed requirements.



IMPROVED EXHAUSTERS for many types of medium pressure air handling services and for pneumatic conveying. Fans can be specially built for special applications.

READY UNITS — for factory ventilation installed either indoors or out-of-doors. Furnished complete with motor and V-belt drive. Capacities to 12,000 c.f.m. Unit shown equipped with outdoor covers.

You can have faith in a Clarage recommendation — faith that your job is figured RIGHT for the required performance — faith that the equipment is built RIGHT to operate year after year with minimum attention and care.

Regardless of what your fan problem may be, we can meet it satisfactorily and with surprising economy. Your inquiry is invited. CLARAGE FAN COMPANY, Kalamazoo, Michigan.

68 PAGES OF VALUABLE DATA

New Manual shows how to properly install and service Clarage fans, blowers and air conditioning units . . . valuable information adaptable to almost any type of fan job. Sent without charge to factory executives, engineers and maintenance officials.

You can Rely on...

CLARAGE

Headquarters for Air Handling and Conditioning Equipment

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA—Canada Fans, Ltd., 4285 Richelieu St., Montreal

GOLDBRICKING

Begins on page 235

afternoon adjustment period. Finally Everett has everything set. About time? Yes—*about time to go home for the day.*

Of course, the whole performance has to be repeated the next day, after the night-shift operator has used his machine.

Machine adjustments take lots of time, so this proves to be one of the ideal ways to goldbrick.

STUDENT SAM • Sam once read a book that suggested he could be a success if he asked questions. Sam never did read the next sentence—which said he should listen to the answers.

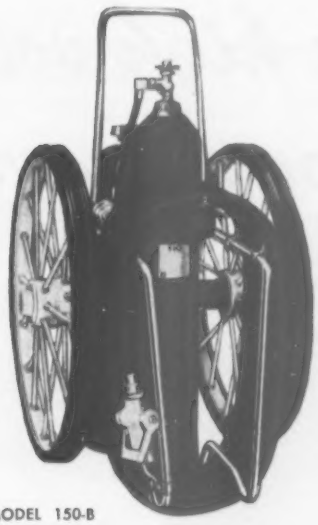
Sam put this success principle to work by asking his foreman all about the job. This flattered the foreman. He spent hours telling Sam all he knew about it.

As a student Sam learned fast. He learned that by asking questions he got the boss talking. While the boss was talking he didn't have to work. It's an ideal way to take life easy on the job.

Every time Sam wants a rest or doesn't feel like working, he asks a question—any question. Even though the foreman answered the same question the day before, Sam still asks and shirks.

What to do? Sam is such an ardent student that maybe he

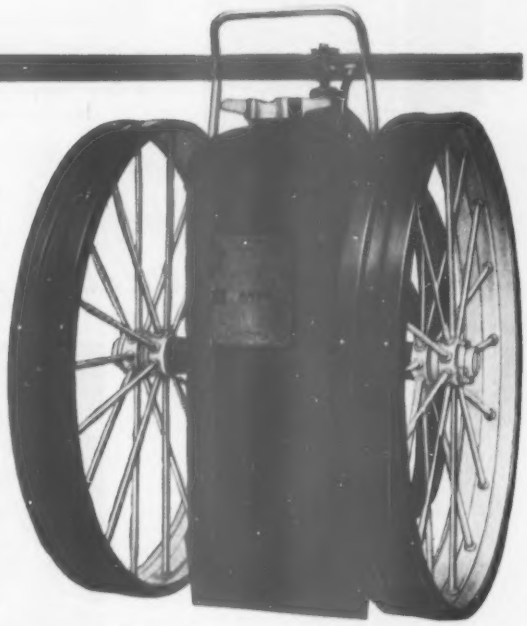
NEW ANSUL WHEELED FIRE EXTINGUISHERS *provide*



MODEL 150-B

. . . GREATER FIRE-KILLING CAPACITY . . . HIGH-SPEED OPERATION and EASIER MANEUVERABILITY . . .

Ansul "B" Model Wheeled Extinguishers are completely new. Dozens of design changes have improved their operating characteristics as well as their appearance. They provide faster, easier extinguishment of fires almost twice as large as those handled by our "A" model wheeled extinguishers. New Ansul Wheeled Extinguishers are easier to move to the fire. They can be actuated faster. They'll put out more fire faster. They're easier to recharge and maintain. And they will give even more years of trouble-free service.



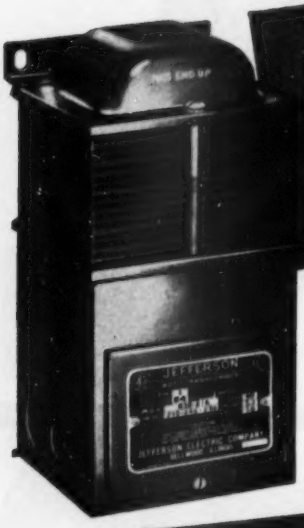
MODEL 350-B

For a demonstration call your Ansul representative today. Or for additional information send for file number *W-30.*

ANSUL
Chemical Company
FIRE EQUIPMENT DIVISION • MARINETTE, WISCONSIN

MANUFACTURERS OF DRY CHEMICAL FIRE EXTINGUISHING EQUIPMENT, REFRIGERATION PRODUCTS, INDUSTRIAL AND FINE CHEMICALS AND LIQUEFIED GASES

For high voltage power users—



Jefferson STEP DOWN Transformers

- Compact size for easy, out-of-the-way installations
- Mounts at point of use
- Quickly relocated at any time
- Dry Type—Air Cooled (No fire hazard)

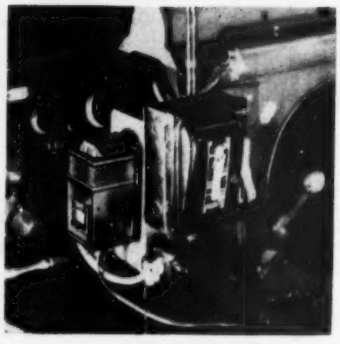
CUT COSTS—

increase electrical efficiency

Installing Jefferson Power Circuit Transformers close to the load, improves voltage regulation, eliminates secondary voltage drop. You save copper and conduit by eliminating long runs of low voltage (115–230) secondary feeders. Being AIR COOLED there are no valves, gaskets or mechanical parts requiring constant maintenance. Jefferson Transformers are compact and lightweight and can readily be relocated if wiring or machinery layouts are altered.

All Jefferson Transformers are equipped with sturdy brackets for mounting directly on machinery or near point of low voltage use. Adequate wiring compartments with ½" and ¾" knockouts are provided. Listed by Underwriters' Laboratories, Inc. *Write for Bulletin 501-15.*

JEFFERSON ELECTRIC COMPANY
Bellwood, Illinois



STOCK SIZES
50 VA to 15,000 VA
460/230 V. Pri. —230/115 V. Sec.
575 V. Pri.—230/ 115 V. Sec.
Special voltages on request.

JEFFERSON ELECTRIC

Jefferson POWER CIRCUIT Transformers

Begins on page 235

should be classified as a learner, with wages to match.

PERPETUAL PETE • One of the most difficult goldbrickers to spot is the fellow who keeps moving—slowly. Perpetual motion may not be real, but if you watch Pete at work you might think it is.

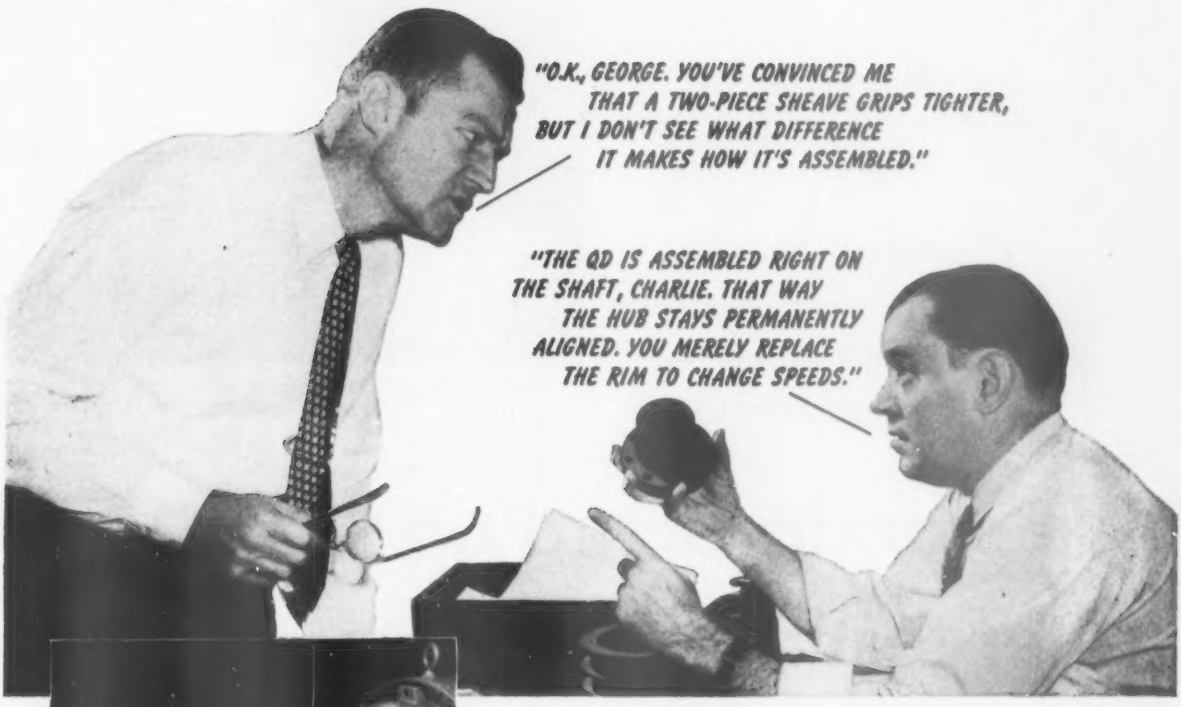
Pete keeps his machine operating at its slowest speed. He misses every other operation. Or he moves like molasses in Juneau.

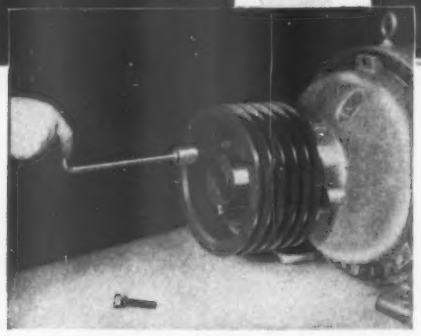
Worst trouble with Pete is that his slow-down strategy is contagious. Others are forced to wait for him. Or they see him getting away with less work and figure they might as well adopt his goldbricking plan, too.

CLEANUP CHARLIE • Neat as a pin is the way Charlie keeps everything around his machine. And why not? Charlie starts his cleanup work as soon as he thinks he can get away with it—15 minutes, half an hour, or even an hour before the end of the shift.

Charlie *likes* to keep things spotless. He has discovered that it is easier to clean up than to do his regular work.

Here's one solution: Since Charlie likes the clean-up job so well, it might be a good idea to transfer him to plant maintenance. Or give him a medal with a broom on it. Or—sweep him right out of the plant with the rest of the goldbrickers.


"O.K., GEORGE. YOU'VE CONVINCED ME THAT A TWO-PIECE SHEAVE GRIPS TIGHTER, BUT I DON'T SEE WHAT DIFFERENCE IT MAKES HOW IT'S ASSEMBLED."
"THE QD IS ASSEMBLED RIGHT ON THE SHAFT, CHARLIE. THAT WAY THE HUB STAYS PERMANENTLY ALIGNED. YOU MERELY REPLACE THE RIM TO CHANGE SPEEDS."



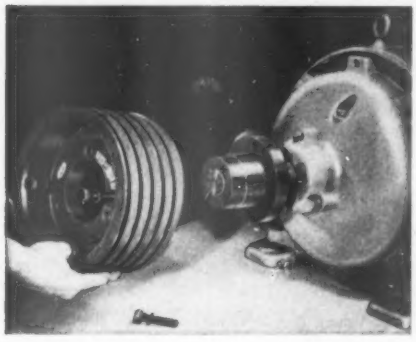
ONLY THE RIM COMES OFF. This is done by using the heavy assembly bolts as jack screws. Then the sheave slides easily off the tapered hub. No time-consuming prying or hammering is required.

"How it's assembled" makes a big difference when you're choosing sheaves!

Because the famous Worthington QD can be assembled and disassembled right *on the shaft*, your maintenance man can change speeds merely by changing rims. The previously aligned hub need not be touched.

On initial assembly, holding alignment of the hub is a snap. All you do is tighten the flange cap screw after positioning the hub along the shaft. Drifting of the key is prevented by tightening the set screw over the key.

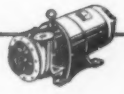
For prompt deliveries, or further information on any Multi-V-Drive equipment, write to Worthington Corporation, Section MV.3.4, Oil City, Pennsylvania.



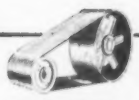
THE HUB STAYS PUT—there's no need to remove it when changing speeds. When you've finished the job, you just replace the rim over it and tighten the bolts. Alignment is *permanent*.

MV.3.4

COMPRESSORS: AIR-COOLED, WATER-COOLED



PUMPS: CENTRIFUGAL, ROTARY, STEAM, POWER



MULTI-V-DRIVES: QD SHEAVES AND V-BELTS

VARIABLE SPEED DRIVES: WORTHINGTON ALLSPEED

WORTHINGTON

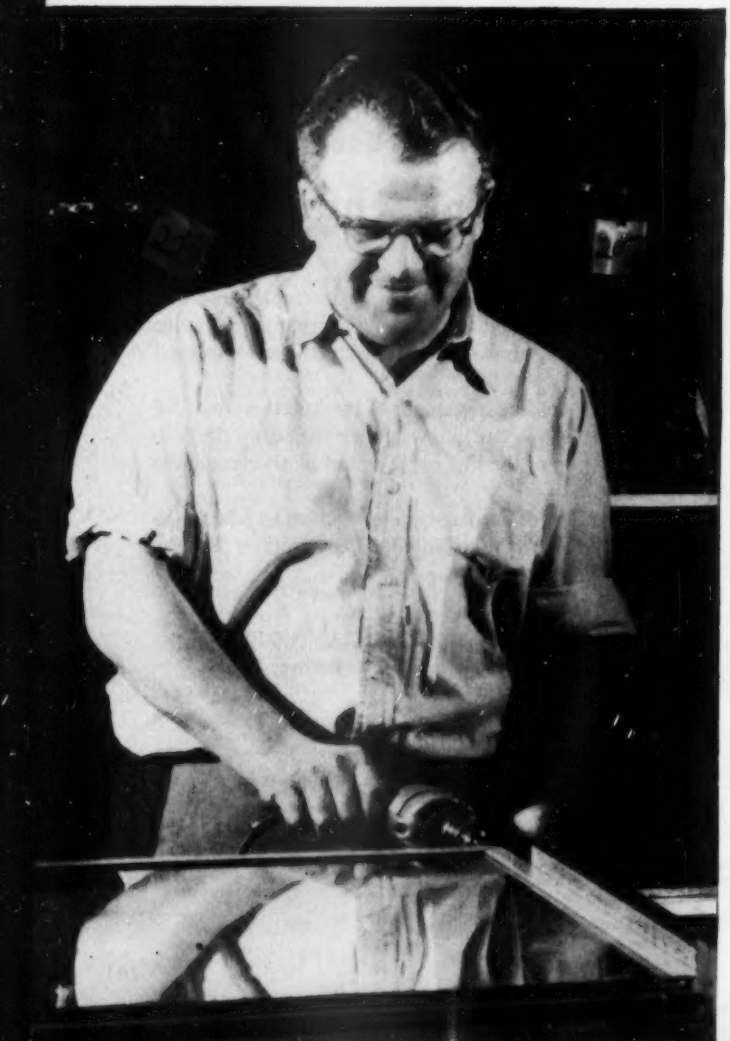
Mechanical Power Transmission

Buy these Worthington standard products from your local distributor

says **Norman Bonomo,**
assistant superintendent,
B & G Manufacturing Co.,
Pittsburgh, Penna.

Norman Bonomo, assistant superintendent, shows samples of his company's products. This nationally famous maker of aluminum windows and doors has been in business seven years—has tested leading makes of drills and standardized on SKIL.

"We standardized on SKIL Drills after testing 5 leading makes!"



"SKIL Drills were *first* in ease of handling, *first* in performance, *first* in low maintenance, and *first choice* of our employees," Norman Bonomo explains. "We make aluminum windows and doors for both commercial and private buildings and keep our power tools—especially drills—in constant hard use. Consequently, we ran extreme tests to determine which make of drill would give us best all-around performance with least service worries.

"Employees agreed SKIL Drills handled best with least fatigue—even in cramped places. Management voted for SKIL fast local factory branch service and low maintenance. No other brand measured up to SKIL!"

All 26 SKIL Drill models have these Features

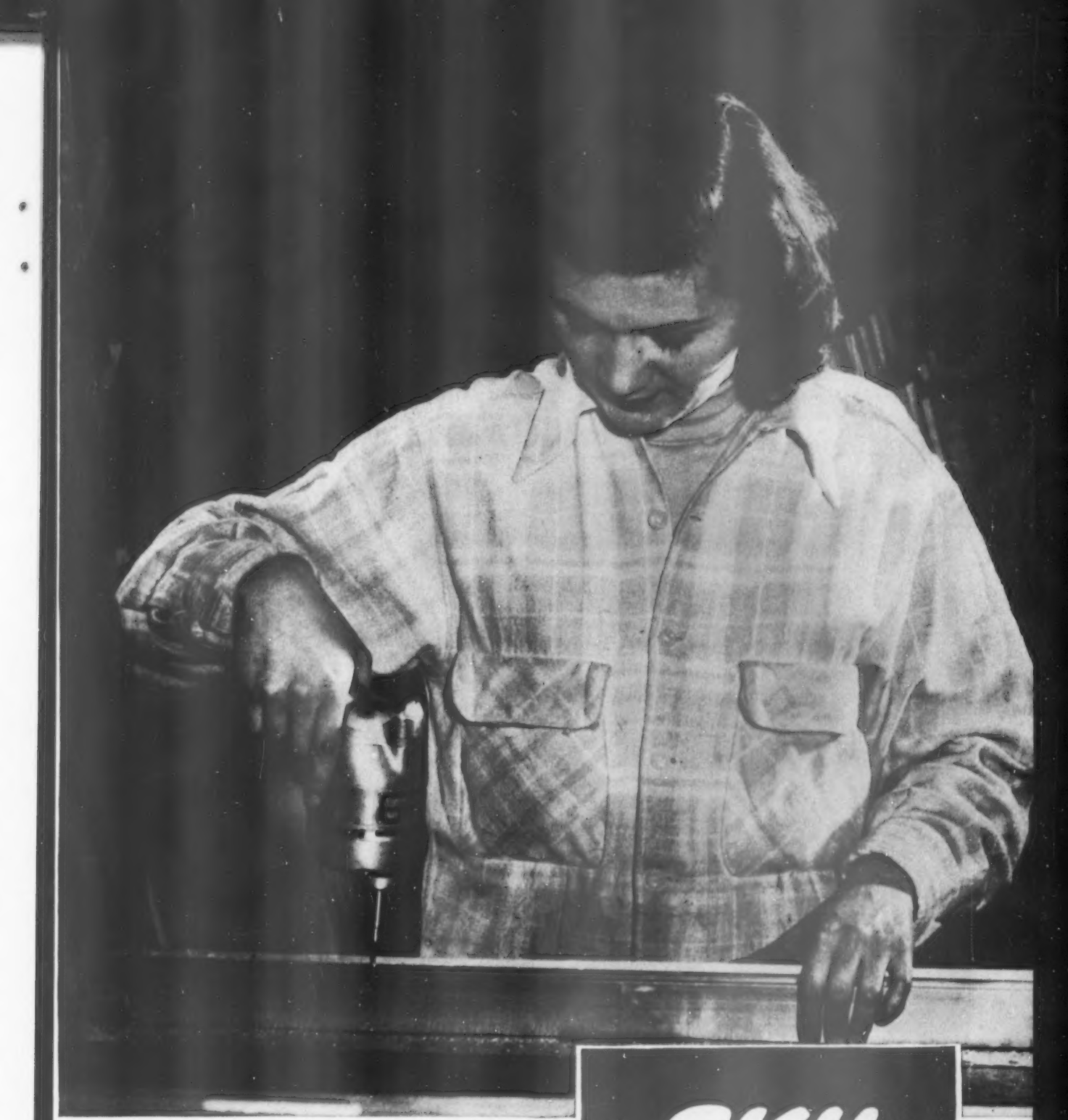
Modern, Compact Design • Helical Gears • Die-Cast Aluminum Housings • Oversize Brushes • Reserve Power • Statically and Dynamically Balanced Motors • Optional speeds available on many models.

Capacities: ¼" to 1" in steel; 2" in hardwood • Speeds: 200 r.p.m. to 5000 r.p.m.

* * *

Harold Bildhauer uses a Model 45 SKIL Drill working on sash inserts. He states, "I handle about 90 or 100 aluminum inserts a day. And I use this SKIL Drill eight hours daily. It is easy to handle, easy to use, because I need less pressure with the drill's power and easy gripping. I'm sold on SKIL!"

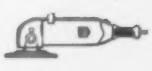
For complete information, contact your SKIL



SKIL Saw

SKIL Driver

SKIL Belt Sander

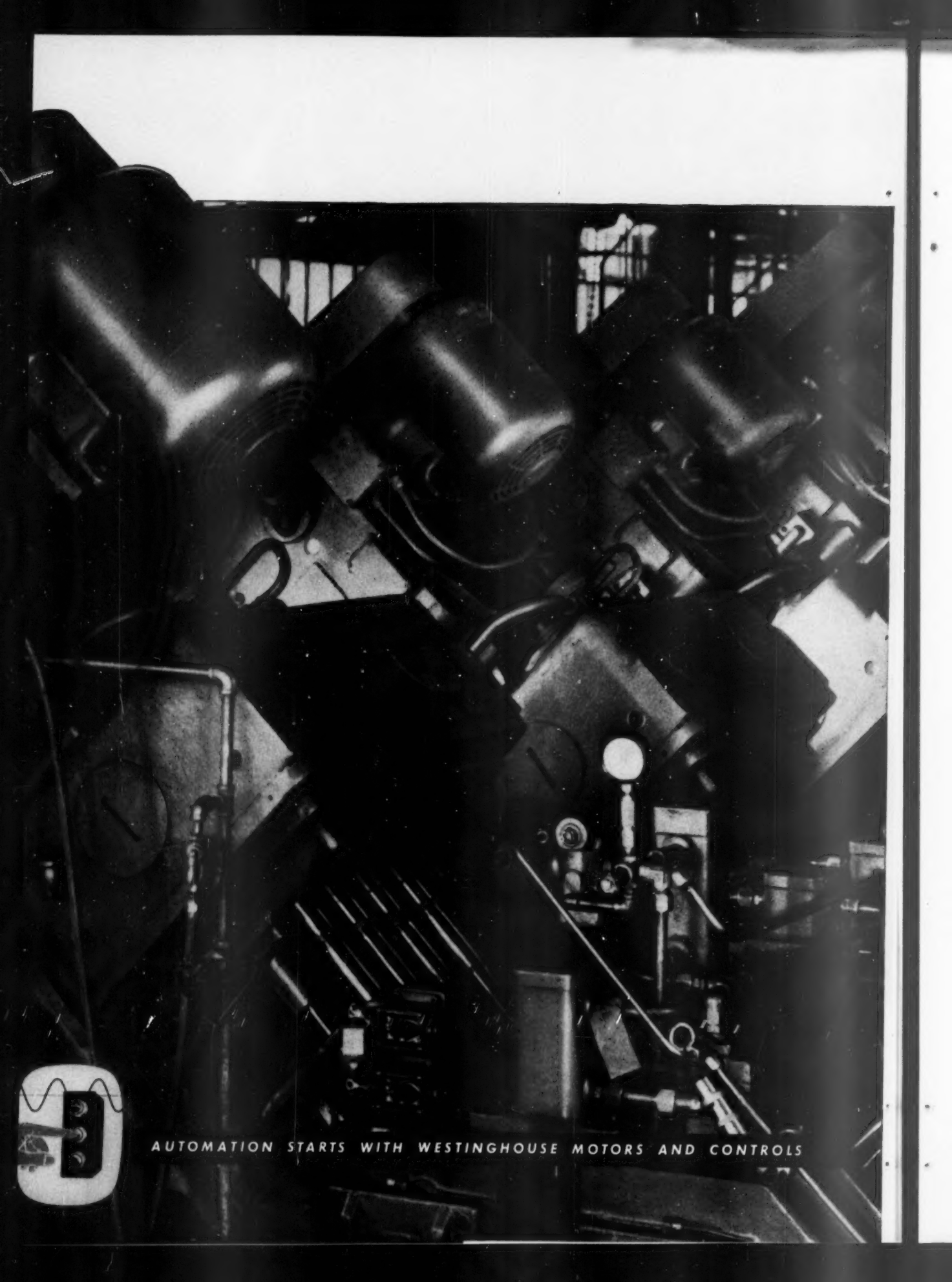


SKIL Disc Sander

distributor or call your nearby SKIL factory branch

SKIL

PORTABLE POWER TOOLS


AUTOMATION STARTS WITH WESTINGHOUSE MOTORS AND CONTROLS

How to keep a production line humming at peak capacity

You can't hear the steady hum, but if you could, you would say, "There's a well-built production line." The line just keeps on running, keeps on machining. It wasn't always that way, but it has been ever since Westinghouse Motors and Controls were installed back in 1950.

You see, when you standardize on Westinghouse Life-Line* Motors and Controls, you're installing the kind of horsepower that really increases output per man. For example, there's no down time for motor lubrication. Life-Line motors are pre-lubricated and sealed for life at the factory. Also, you don't need to worry about starters sticking. Life-Line Starters have an advanced clapper design that depends on a positive spring action instead of gravity. They can't stick or jam.

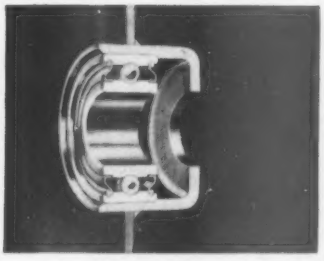
*Trade Mark

Remember, too, that Life-Line Starters give you permanent overload protection. A bimetallic snap-action, disc-type overload relay provides foolproof operation. It never loses its accurate factory calibration. And special insulation gives Life-Line motors maximum dielectric strength . . . enables them to resist moisture and mild chemicals.

Get these free moneysaving facts

101 Life-Line Case Histories, B-4769, tells how 101 other manufacturers have used Life-Line motors to keep production humming at peak capacity. After you read how, see how from the movie, *Life-Line Speaks for Itself.* Phone your Westinghouse representative for this vital information, or write to: Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa. J-21753

Here is a closing arrangement with fewer moving parts. The entire contact assembly pivots on a knife-edge of hardened steel. There are no sliding surfaces to bind or wear . . . no misalignment troubles. Jamming and sticking are eliminated. Nothing need be lubricated.



Westinghouse Pre-lubricated Bearings have the proper lubricant sealed in at the factory. Greasing schedules can be forgotten. Special seals guard against the entrance of harmful dust and dirt which ordinarily spell wear and possible bearing burnout.

YOU CAN BE SURE . . . IF IT'S

Westinghouse

SIGNIFICANT DEVELOPMENTS IN PRACTICAL LABOR RELATIONS

TOLD IN BRIEF FOR BUSY FACTORY EXECUTIVES

By PAUL A. KING • Attorney, Bigelow-Sanford Carpet Company, Inc.
Member, New York Bar

JAIL NO EXCUSE FOR NO NOTICE TO BOSS. *Arbitrator rules jailed employee must notify boss of his absence* . . . . . **Page 246**

NO COMPULSORY RETIREMENT HERE AT AGE 65. *Daystrom's flexible retirement age plan makes sense and seems to work* . . **Page 246**

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COMPANY DENIED RIGHT TO RETIRE INEFFICIENT EMPLOYEE. *Clause in Ford-UAW pension contract seemingly guaranteed this right. But the arbitrator ruled otherwise* . . . . . **Page 250**

EMPLOYER ASSOCIATIONS CAN FIGHT "PIECEMEAL" STRIKES. *NLRB permits non-struck association members to lockout employees of union striking another member* . . . . . **Page 252**

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Jail No Excuse For No Notice to Boss

"Dear Boss — Wish you were here. [signed] John Employee, City Jail." A note like this might have saved John's seniority.

Seemed that the union contract provided for a loss of seniority after three days' absence without notice. An arbitrator ruled in favor of the penalty when a jailed employee failed to advise his boss where he was until five days later. *(Sivyer Steel Castings Award)*

No Compulsory Retirement at Age 65

Is 65 a magic number for retirement plan? Does automatic retirement at 65 solve all your administrative and employee relations problems?

Daystrom, Inc., of Elizabeth, N. J., doesn't think so. It favors a flexible retirement age based upon physical condition and performance—not on an arbitrary age requirement of 65. Company concluded that "not all of our mature employees can be drawn through the same knot hole when they become 65, that not all employees are the same physical and mental age at a chronological 65 . . ."

Do earlier retired employees feel discriminated against? Doesn't this policy make pension administration harder?

Daystrom adopts the practical approach that if you can't "sell"

Conserve Manpower with Completely Mechanized Scrubbing

New SELF-POWERED SCRUBBER-VAC

Cleans Vast-Area Floors "By the Mile"

Freedom of range and *four-in-one performance* combine to give this *Gasoline-Powered Combination Scrubber-Vac* its exceptional cleaning capacity. Operating independent of power lines, the machine is free to go wherever the operator guides it . . . working in and out of production areas with ease . . . *scrubbing continuously . . . actually cleaning floors by the mile!* And this single unit — *Finnell's 218G* at left — applies the cleanser, scrubs, rinses if required, and damp-dries the floor — *all in one operation.* Thus it is capable of cleaning up to 16,000 sq. ft. per hour!

Self-starting engine eliminates rope-pulling as a means of starting. The *218G* starts quickly and easily by pressing the starter button. Operator will shut off rather than idle the machine, and thereby prevent carbonizing, a cause of engine trouble. All working parts of the *218G* are operated by *one* engine (2 cyl., 4 cycle, 9.4 hp., air-cooled). And there are no switches to set for *fast* or *slow* — slight pressure of the hand on clutch lever adjusts speed to desired rate (up to 136 ft. per minute). Two 18-inch brushes give a 36-inch scrubbing surface. The powerful vac performs quietly. Gasoline only is used for fuel (no mixing required).

Whatever the area of your floors, find out what *you* would save with a *Combination Scrubber-Vac. Finnell* makes a full range of sizes, including *electric* as well as *gasoline* models . . . available on lease or purchase plan. It's also good to know *there's a Finnell man nearby* to help train your maintenance operators in the proper use of *Finnell Equipment* and to make periodic check-ups. For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2509 East St., Elkhart, Ind. Branch Offices in all principal cities of the United States and Canada.

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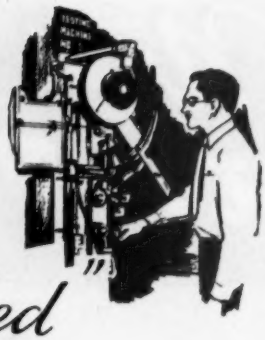

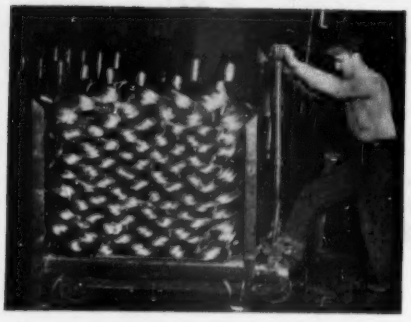

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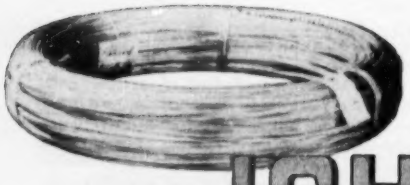

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PRACTICAL LABOR RELATIONS

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an employee retirement, perhaps your reasons for requiring him to retire are faulty—and need reexamination. Furthermore, a flexible retirement plan isn't any harder to administer than most other personnel programs that require judgment, evaluation and salesmanship. If you wish more dope on the Daystrom Plan get in touch with Mr. Wilbur R. Hanawalt at Elizabeth, N. J.

Employer Can Fire "Sick Strikers"

One of these days this might happen to you: You and the union agree to negotiate and settle a problem—a new work schedule; we'll say. In the meantime, you put it into effect.

Right off the bat, employees stay home because "they're sick" or "their auto broke down" or they "attended a union meeting." This appears to you to be a violation of a no-strike no-interruption-of-work clause in the contract.

Can you fire these workers? National Labor Relations Board Trial Counsel worked hard to prove that you can't. However, the NLRB itself said these workers had engaged in a concerted work stoppage, which violated the no-strike clause, and could be canned. *(Kaiser Aluminum and Chemical)*

And Now You Bargain On Profit-Sharing Plans

Remember back in 1948 when the National Labor Relations Board ruled in the Inland Steel case that you must bargain with the union on pension plans? Just in case you had any doubt, a recent NLRB ruling makes it clear that you must bargain with the

George M. Jolly, head of the Milium Division of Deering-Milliken & Co., tells how . . .

"We helped sew up $500,000!"

"A Kansas City coat manufacturer had $500,000 in sales sewed up—except for the linings! Buyers had flooded him with re-orders for 12,000 Milium-lined Fall coats. But the uncompleted coats were hanging in the loft.

"12,000 Milium linings had to catch up with 12,000 coats—and fast, too. We called in Air Express!

"As fast as the cloth was dyed and finished in New England, it was rushed to South Carolina and processed as Milium insulated linings, then speeded to Kansas City. Every deadline was met —and the deal was sewed up.

"Our customer's 12,000 coats were turned into a fast $500,000—thanks to the speed and reliability of Air Express!

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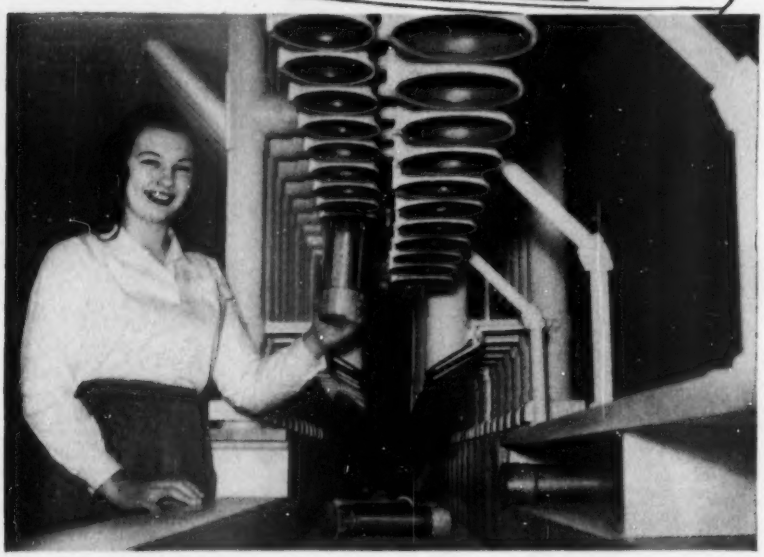

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PRACTICAL LABOR RELATIONS

Begins on page 246

union on a profit-sharing plan too.

But a profit-sharing stampede —like the big pension drive— doesn't seem likely. Profits can't be shared when there are no profits. So most unions oppose the scheme, still prefer "fixed commitments," which the worker is supposed to be able to count on even in profitless years. *(Black-Clawson Company)*

When Non-Commie Oaths Are Okay for All

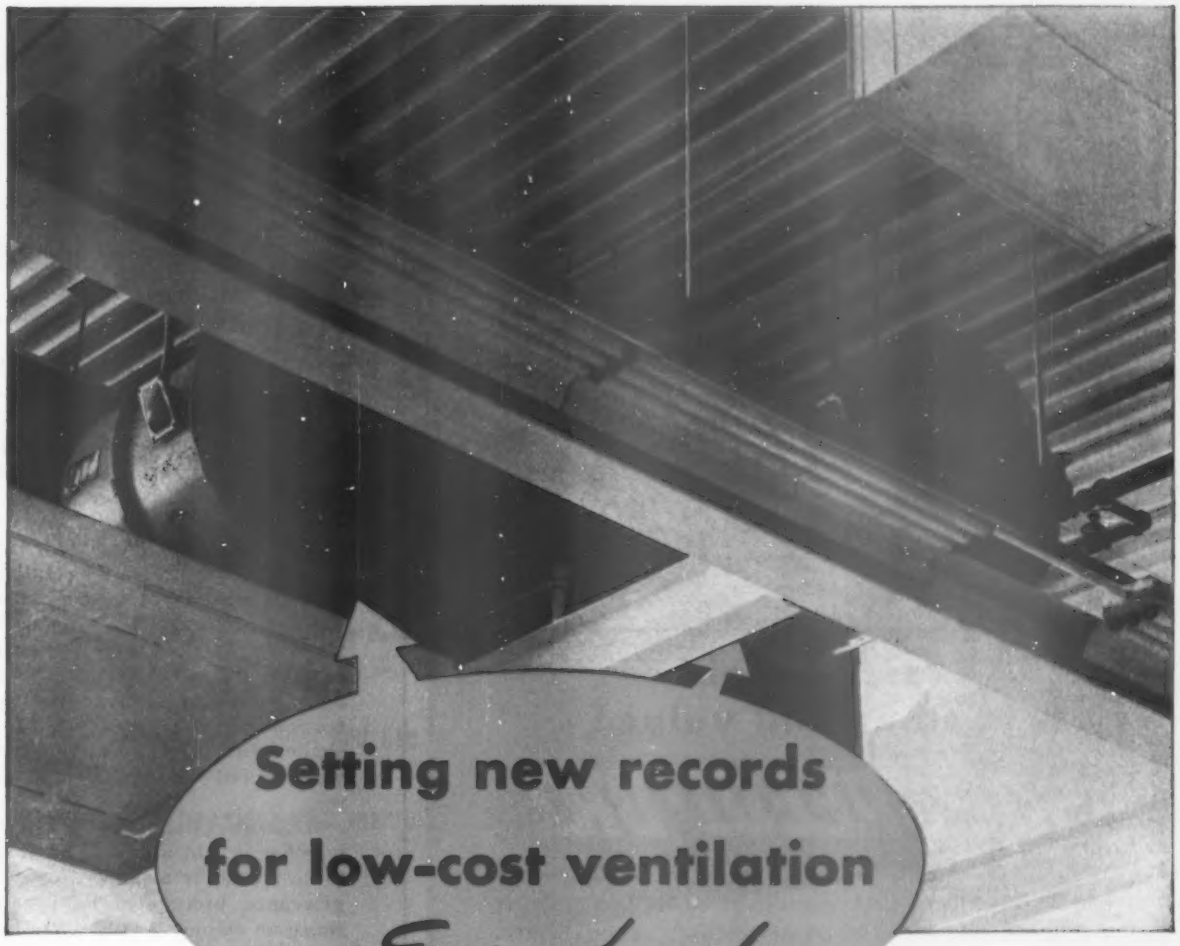
Are you skeptical—along with many other employers—of the effectiveness of the non-communist affidavit provision of the law as a means of keeping red unions out of your hair? If so, you *may* get away with a contract requirement that all union representatives—officers or not—sign non-communist affidavits.

At least, the National Labor Relations Board indicates that insistence upon such a requirement as a condition of signing a union contract will not nesessarily be considered bargaining in bad faith. If, that is, the employer feels this is needed for reasons of national security or by defense regulations.

However, if the company insists upon a clause merely to avoid reaching an agreement with the union, the company will be held guilty of illegally refusing to bargain.

Company Denied Right to Retire Inefficient Employee

Just as you can't tell the effect of a law until the courts have applied it, you may not know what your contract clause stands for until an arbitrator has worked it over. Try your hand at guess-



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PRACTICAL LABOR RELATIONS

Begins on page 246

ing what arbitrator Harry Shulman did to this one.

Ford Motor's pension contract with the UAW reads: "The Company at its sole discretion may retire any employee at age 65 or older by reason of the employee's inability to perform, efficiently, work assigned to him." Ford retired a 67-year-old janitor. Said he couldn't do his job efficiently.

The union opposed this decision. Argued that the employee was able to do his work in a normal manner. Further disagreed with the Company's contention that its decision could be challenged only if the employee were retired for some other reason.

Arbitrator Shulman ruled that whether or not a man is unable to do the job is a subject for the grievance procedure. Ford can retire an employee only when he is found to be disabled.

The clause doesn't give Ford much, does it? If you expect bigger things from your pension contract, better think of a better clause than this one.

Associations Can Fight "Piecemeal" Strikes

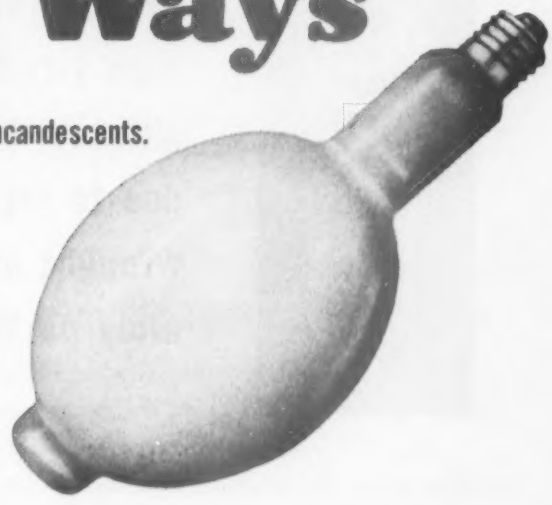
In the past, unions have often pulled a strike against just one member of an employer association. The pressure of business being lost to non-struck fellow-members was calculated to bring the unfortunate victim to heel. Then, the gains won there were spread to other members one-by-one.

However, some associations agreed to stop work when one member was struck. In the recent Dan's Furniture case, National Labor Relations Board found that the "lockout" was an interference with the employee's right

Westinghouse Mercury Type Lamps Can Cut Your Lighting Costs 2 Ways

1 They give more light and use less watts than incandescents.

2 They slash your maintenance costs.



The 1000 watt Westinghouse Mercury lamp, using 1085 watts, produces 50,000 initial lumens . . . while a standard 1500 watt incandescent uses 1500 watts, yet gives only 33,000 lumens. Thus, in a typical high bay installation, 18 mercury lamps easily replace 23 incandescents. And since Westinghouse Mercury lamps have an average rated life of 5000 to 6000 hours, compared to an incandescent's 1000 hours, costly replacements and expensive labor cleaning costs are also reduced.

Now too, Westinghouse *Fluorescent* Mercury lamps produce a golden white light, eliminating the need for color-correcting incandescents where white light is desired. The newest size Westinghouse, 1000 watt *Fluorescent* Mercury Lamp, is the cheapest source of mass white light in the world.

Free 24 page booklet explains how Westinghouse Mercury type lamps lower lighting costs in areas such as:

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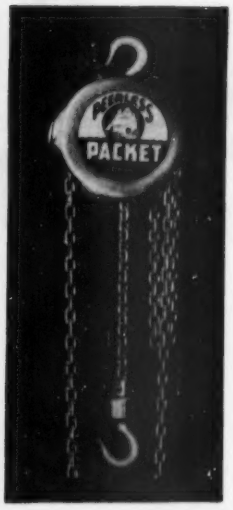

21 lb. lighter than 1-ton all-steel Packet—due to high tensile wrought aluminum alloy parts

This saving in weight is achieved by the use of high tensile aluminum alloy housing, hand chain wheel, hand chain and center frame. Though much lighter in weight, the aluminum Packet retains the drop-forged, heat treated steel hooks; the electrically welded, oval link, heat treated, steel load chain; and the mounting of rotating parts on prelubricated, shielded ball bearings of the all-steel hoist.

To obtain more information on these lightweight, spur geared hoists that are easily carried from place to place and that lift capacity loads smoothly and safely, look in your classified telephone directory under "Hoists" for your nearest Harrington distributor. Or write for Bulletin P-5.

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PRACTICAL LABOR RELATIONS

Begins on page 246

to strike and discouraged union membership.

But a U. S. Court of Appeals refused to go along with this view. It found that the employers were acting to protect themselves against whipsawing tactics—said that was a valid activity.

The NLRB has now okayed a lockout by a general building contractors association, finding economic justification. The plumbers had struck against some members of the association. The non-struck association members, said the finding, could reasonably anticipate that their activities would be adversely affected. *(Associated General Contractors)*

Don't Run Afoul of State Laws

Watch those state laws. When it comes to running your business successfully, they're as important as Federal Laws—unless and until the reported "Eisenhower revisions" of Taft-Hartley are adopted by Congress.

Here's the latest example where an employer almost ran afoul of a state law—because the union insisted he deduct 7½ cents an hour from each employee's pay as a contribution to a medical and insurance program.

The state was California. And California requires individual authorizations for wage deductions of the kind involved in this case. The union insisted they were unnecessary because the deductions were authorized by a union contract, and under the Taft-Hartley law individual authorizations are not required.

Not so, says a Federal District Court in California. The individual authorizations are a "must." *(International Woodworkers)*

Turn the page

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PRACTICAL LABOR RELATIONS

Begins on page 246

BRIEF BUT IMPORTANT

► **Arbitration no bar to Wage-Hour suit.** New York court says employee's right to sue under Wage-Hour Law can't be curtailed by union-company agreement to submit question to arbitration. (*Berman*)

► **New definition of nepotism.** NLRB can't keep the boss's nephew out of the bargaining unit of employees and prevent him from voting in a representation election, says a United States Court of Appeals. Spouse and child may be excluded—not nephews. (*Sexton Welding*)

► **More about who's a supervisor?** Group leaders who recommend temporary and permanent transfers, give time off and see to it that department production schedules are met. They're supervisors under the T-H and can't vote in a representation election. (*Ideal Roller*)

► **Pickets' loudspeakers need permits.** It's not unconstitutional for a town to require picketing unions to secure a permit to use loudspeakers on cars and trucks on a local highway. So rules a California District Court of Appeal. Doesn't limit right of free speech. (*Haggerty*)

► **Internal Peacemaker for CIO.** Nathan P. Feinsinger, former Chairman of Wage Stabilization Board and professor of law at the University of Wisconsin, accepts $15,000-a-year arbitration job with the CIO. Duties: Help settle jurisdictional disputes within CIO.

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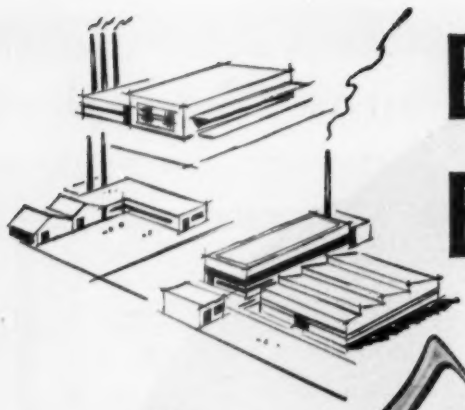
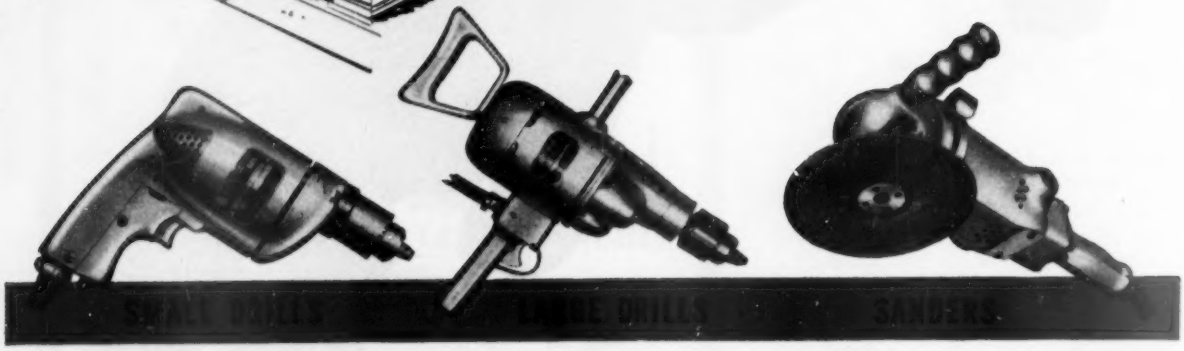
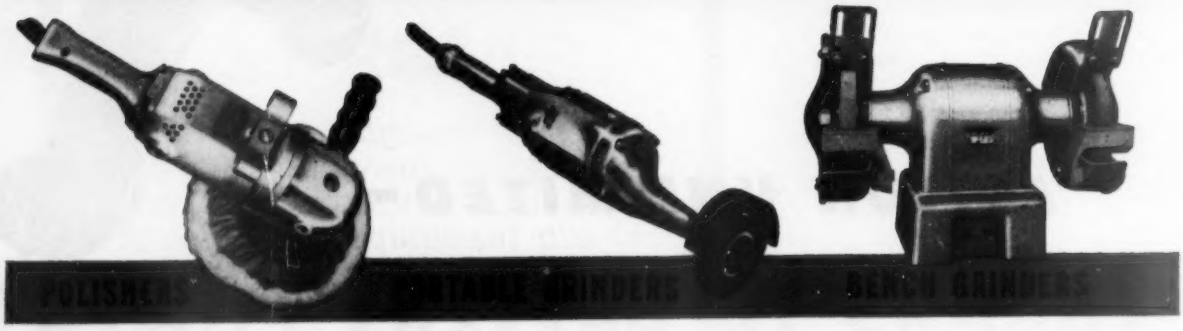
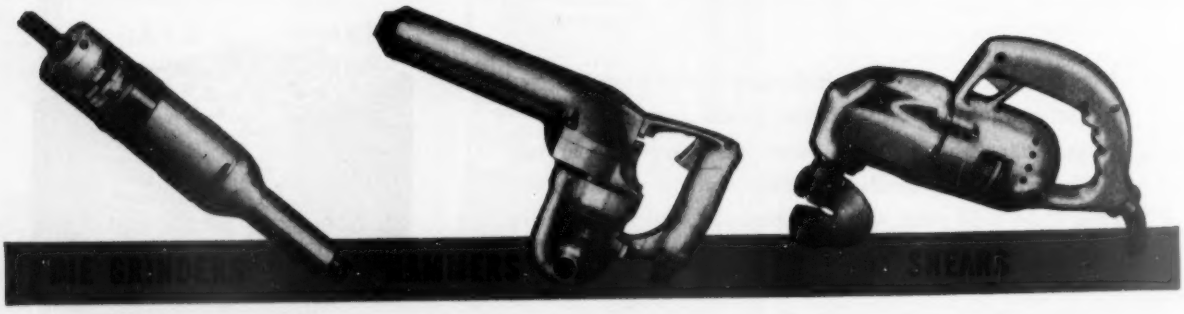


BLACK & DECKER ELECTRIC TOOLS







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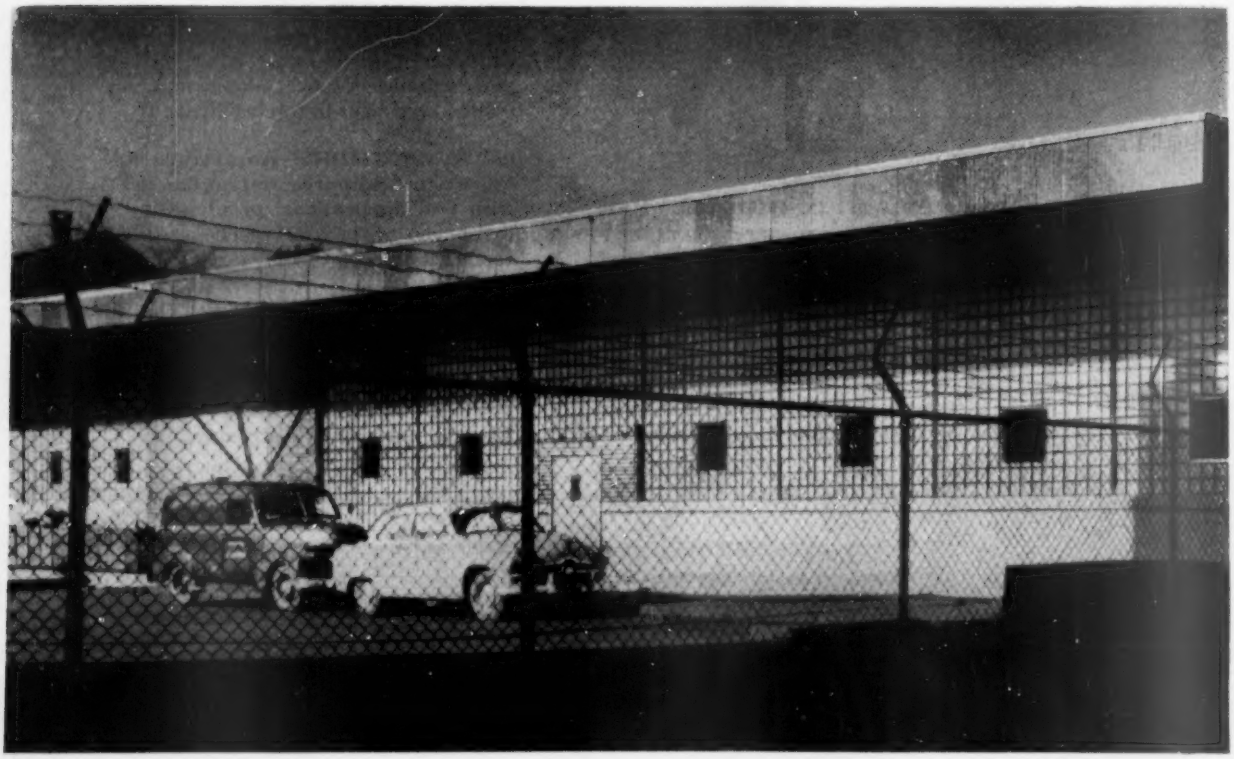

will pay in 7 years,"

says **John A. Wilson,** *President*
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BETTER DAYLIGHTING—Functional patterns direct daylight to reflective ceiling, or distribute it uniformly throughout the room. More light, less glare.

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NO DIRT INFILTRATION—A glass block panel is an integral part of your building wall. Tight mortar joints seal out moisture, dirt.

LESS OUTSIDE NOISE—PC Glass Blocks are hollow. The dead air spaces reduce sound transmission.

Pittsburgh Corning Corporation
Dept. N-93, One Gateway Center
Pittsburgh 22, Pa.

Please send me a free copy of your booklet "PC Glass Blocks—the Mark of a Modern Building."

☐ Send engineer to discuss specific problems.
☐ Advise nearest source of supply.

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—says THE NORTHERN PACIFIC TRANSPORT CO.

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For nearest LUBRIPLATE distributor, see Classified Telephone Directory. Send for free 56-page "LUBRIPLATE DATA BOOK"... a valuable treatise on lubrication. Write LUBRIPLATE DIVISION, Fiske Brothers Refining Co., Newark 5, N. J. or Toledo 5, Ohio.

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

If you want subordinates to grow ...

Train 'em to Delegate Responsibility

By LESTER F. ZERFOSS • Staff Assistant to the Director of Industrial Relations
American Enka Corporation, Enka, N. C.

INCREASING WILLINGNESS to delegate responsibility—and improved skill in doing so—are basic to the growth of executives. Real delegation is the primary tool that an executive has for training his subordinates day-to-day on the job. It is wishful thinking to believe this job can be farmed out to schools, seminars, or staff departments.

Let's face it. If you have a supervisor reporting to you who needs to unload some of his duties and free himself to accept additional assignments from you, you will have to handle this training job yourself. If you don't do it, in all likelihood it will never get done—and two good men will miss development.

The following 7-step procedure contains some specific suggestions that will help you help your subordinates improve their skills in delegating work, in turn, to their subordinates.

STEP 1 Prepare your subordinate to accept additional responsibility in a chosen area in which you need to delegate.

1. Review with him the facts in his own appraisal and yours which indicate the need for more effective delegation.
2. Frankly discuss with him the relationship between his own growth and new experience.
3. Explain to him that through the medium of carefully chosen assignments you are planning to give him a maximum opportunity to grow in his job.
4. Explain to him that you are setting up some specific assignments with this end in view, and that you will talk to him in a little while about the first of these.

STEP 2 Select a suitable job to be delegated to this subordinate, and plan your assignment to him in terms of *what*, *why*, and *when*.

1. He should have some of the knowledge and skills required to carry out the job, but there should also be in it enough new experience to make it profitable for his own growth.
2. Be prepared to explain to him why you have selected him to do this job.
3. Study this job as a concrete assignment so that you can explain to him *why* this job has to be done, *what* you want done, and *when* it has to be finished.

STEP 3 Discuss this job with the man and give him a specific assignment to plan the how of the job.

1. Explain to him what the job is, when it has to be finished, why you chose him to do it.
2. Review with him the present experience he has had which makes you believe he can tackle this job; specifically, point out to him the new experience values you expect the assignment to give him.
3. Ask him to prepare for you a *plan and time* schedule, showing how he expects to handle this job.
4. Stimulate him through questions as to (1) the methods he

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FLEXIBLE, LIGHT, BUT RUGGED AND STRONG . . . Yes, you save money because Homoflex lasts longer. It's easier to coil and uncoil . . . no pre-set twist . . . no kinking . . . easier to carry and drag. "Flexible as a Rope". Workmen like it. Cover and tube are inseparable and hosewall is strong and safe, for handling air, water, other fluids and gases. Ask the R/M distributor for Bulletin 6879. He'll tell you about other R/M hose types for steam, oil, suction, chemicals—from small 1/4" size, to huge dredging hose big enough for a man to crawl through . . . also how you get MORE USE PER DOLLAR with R/M transmission, and conveyor belt, and V-belts.

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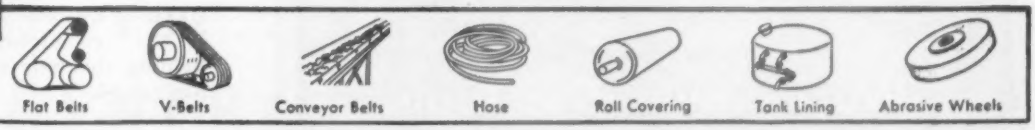

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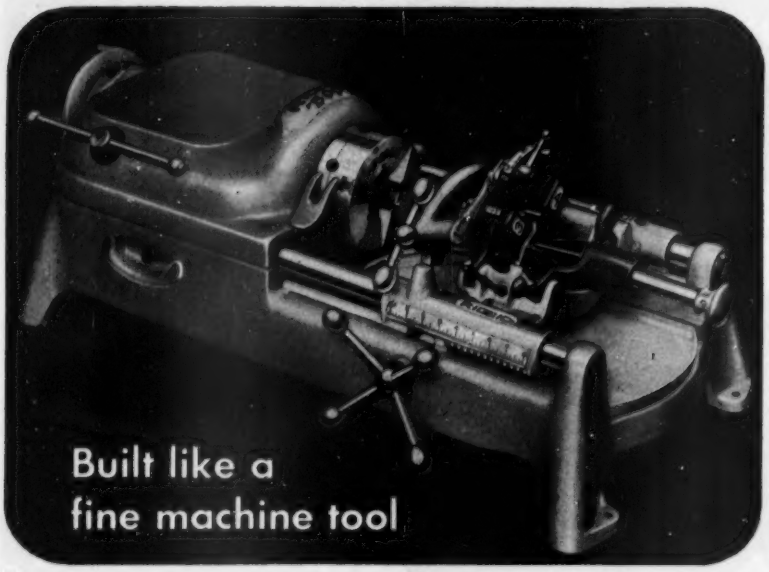

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THE RIDGE TOOL COMPANY • ELYRIA, OHIO

Begins on page 262

will expect to use, (2) the assistance of other people he may require, (3) permissions or approvals he will need as he goes along, and (4) the priority he will have to give to the job to finish it on schedule.

5. Set a specific time when you will review with him his proposed time and plan schedule.

STEP 4 Meet with him again to review and approve his plan for getting the job done.

1. Determine how much of his plan is practical and workable. Raise questions about any of it which may need re-thinking.
2. Discuss the areas of the assignment where he is not on sure ground until he *anticipates* the difficulties. (New people to work with? Skills not used before? Policies or procedures he's not familiar with? Etc.)
3. Suggest help or source of help available to him.
4. Approve his plan and time schedule as agreed upon and give him strong recognition for the planning job done so far. Express your confidence in his ability to handle this assignment as planned.
5. Agree on reasonable follow-up dates when you can discuss with him his progress.

STEP 5 Review his progress on schedule at mutually agreed upon strategic points.

1. Have him tell you how things are going. (Listen to hear what difficulties he is encountering. What new experience he is getting. The effectiveness of the methods he is using.)
2. Discuss with him any changes that should be made in the original plan as a result of his experience to date. Adjust completion date as may be necessary.

STEP 6 Evaluate with him the completed job, highlighting the new experience he has gained.

1. Analyze with him the quality,

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Says **HINSDALE SMITH, Jr., President**
Nikor Products Co., Springfield, Mass.

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"Service that looks out for our interests is just one reason we're satisfied with General Electric tubes."

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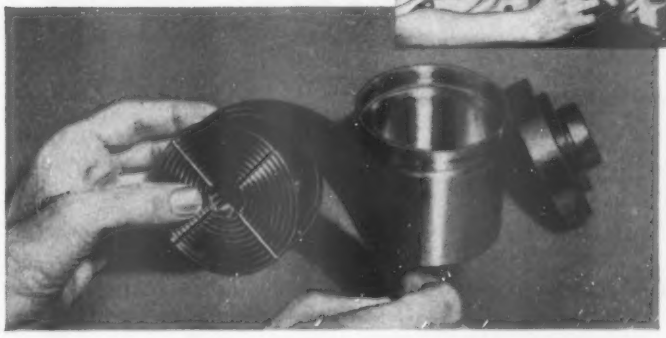
Phone *your* G-E distributor for service that matches your need for economical, efficient tube performance! *General Electric Company, Tube Department, Schenectady 5, N.Y.*



● Specialists in metal photographic equipment that is shipped all over the world—reels, tanks, flash guns, etc.—Nikor Products Company employs electronic tubes of many types, chiefly for resistance welding. Here a 35-mm. film-developing reel of stainless steel is being electronically spot-welded. The finished product, with tank, is shown below . . . Nikor's high-rate production, according to the management, is due in part to G-E tube dependability.

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LOGAN X-SERIES BALL BEARING. Balls are caged in a steel container. Binding and friction caused by balls contacting each other is eliminated.

Logan leads again — with the most important bearing development for conveyor rolls in twenty years. Now available at about same price as regular conveyor bearings. Note: 33% less grade required on gravity lines. Write for details.

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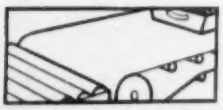

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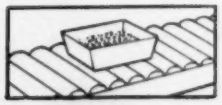
For Live Roll Conveyors



For Roller Conveyors

LOGAN CO., 510 CABEL ST., LOUISVILLE, KY.

Begins on page 262

quantity, cost, and time values in the assignment.

2. Get him to explain what improvements or changes in methods he would try out if he were doing the job again.
3. Discuss with him the experience values he has received from this assignment in terms of his own development and help in other assignments.
4. Give him all the praise possible (honestly and sincerely). *Make him feel good about the job he has done.*

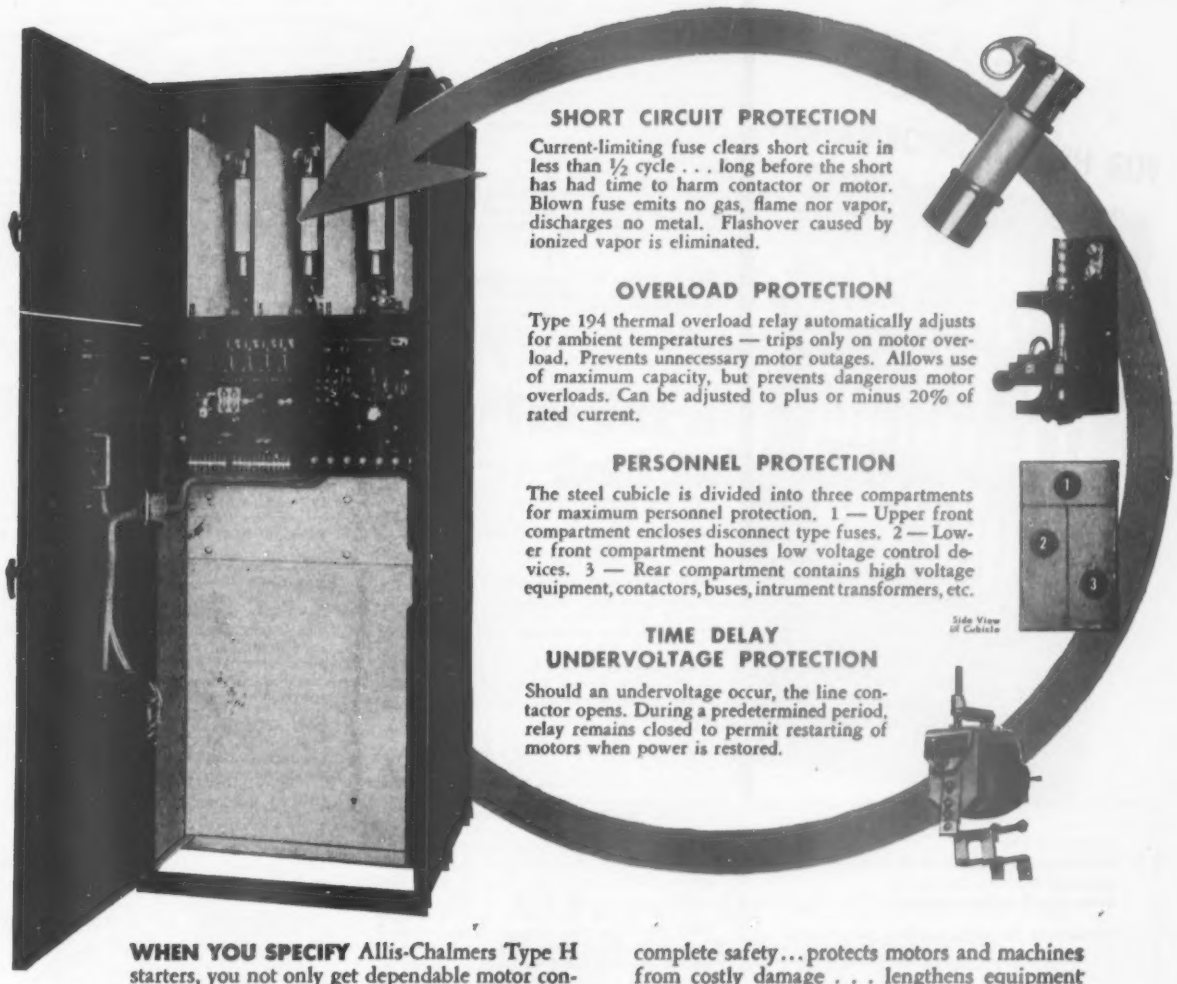
STEP 7 **Keep a record of this delegation and build on it when giving this man his next assignment.**

1. Include specific suggestions for further improving his work.
2. Make it the basis of an organized development program for him in terms of his potential and the organization's need.

Six Basic Principles of Good Delegation

1. **The supervisor in delegating a responsibility does not lose it.** He must still answer for the results obtained; he retains the responsibility for checking, supervising, and following up on the jobs he assigns to others.
2. **The job to be delegated must be suitable for the person selected to do it.** That person must have the ability *with training* to do the job well.
3. **The man must understand clearly what the responsibility is.** The area of responsibility delegated must be clearly defined for all concerned.
4. **The responsibility must be acceptable to the man who takes it.** He must be willing and wholeheartedly cooperative.
5. **The man must be made to feel accountable for the fulfillment of his task.**
6. **The man must get honest recognition for responsibility taken** when the assignment has been well carried out.

Type H Starters Give YOU Full Protection



SHORT CIRCUIT PROTECTION

Current-limiting fuse clears short circuit in less than ½ cycle . . . long before the short has had time to harm contactor or motor. Blown fuse emits no gas, flame nor vapor, discharges no metal. Flashover caused by ionized vapor is eliminated.

OVERLOAD PROTECTION

Type 194 thermal overload relay automatically adjusts for ambient temperatures — trips only on motor overload. Prevents unnecessary motor outages. Allows use of maximum capacity, but prevents dangerous motor overloads. Can be adjusted to plus or minus 20% of rated current.

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The steel cubicle is divided into three compartments for maximum personnel protection. 1 — Upper front compartment encloses disconnect type fuses. 2 — Lower front compartment houses low voltage control devices. 3 — Rear compartment contains high voltage equipment, contactors, buses, intrument transformers, etc.

Side View of Cubicle

TIME DELAY UNDERVOLTAGE PROTECTION

Should an undervoltage occur, the line contactor opens. During a predetermined period, relay remains closed to permit restarting of motors when power is restored.

WHEN YOU SPECIFY Allis-Chalmers Type H starters, you not only get dependable motor control, but you are assured of an all-important "plus"— FULL PROTECTION for man, motor and machine. Positive protection as engineered into Type H starters permits men to work in complete safety... protects motors and machines from costly damage . . . lengthens equipment life . . . increases production by reducing downtime. Get all the facts from your nearby A-C representative or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3982

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Check these G-E Wiring Bulletins

For your free copies of these important G-E publications, MAIL COUPON NOW. Just jot down the numbers you want, and fill out the coupon.

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(2) Interlocked Armor Cable Booklet #19-211—20-page booklet consolidates system's component parts, cable, fittings, and racks—all under one cover. Tells why, where, and how to use this system designed for voltages up to 15 kv.

(3) Super Coronol*-Geoprene Power Cable Booklet #19-342 — 16 pages of test data, specifications and splicing and terminating instructions.

(4) Geotrol Wire Flyer #19-410—describes use, explains advantages of this gasoline- and oil-resistant wire.

(5) Flamenol* Wire and Cable Booklet #19-191 — 12 pages covering development, types and uses of G-E Flamenol cables. Tables list selection data and properties.

(6) Switch and Outlet Box Chart #18-81-1—describes General Electric switch, utility and outlet box line in chart form. Shows correct number of conductors permitted in G-E switch, utility, and outlet boxes. Ideal for quick reference by electricians, contractors, inspectors and maintenance men.

(7) Remote-Control Installation Guide #16-370 — Folder serves as guide for preparing specifications for installation of G-E remote-control wiring system and electrical wiring.

(8) Q-Floor Wiring Data Manual #18-152UF—Sixty-six-page catalog that covers all aspects of G-E Q-Floor wiring from description of system to components and installation data. Profusely illustrated with photographs and dimensional drawings.

(9) Flexible Conduit Broadside #18-238—covers in general the wide variety of flexible steel conduit applications.

(10) Magnet Wire Booklet #19-273—32-page booklet details G-E magnet wire data. Specifications, properties, uses and advantages of various types are among subject thoroughly covered.

(11) Grounding Outlets and Plugs Bulletin #16-801 — contains complete product and catalog information on specially designed G-E grounding outlets and plugs.

(12) Levelock Switch Box Folder #18-100 — illustrates 5 new Levelock features designed to solve common switchbox installation problems.

(13) How to Estimate for G-E Fiberduct Underfloor Wiring, #18-141UF — comprehensive folder that describes the easy method of estimating materials, labor units, and costs for G-E Fiberduct wiring systems.

(14) Copper Weight Chart #19-132—Single sheet showing weight of bare copper conductors in various types and sizes of wires and cables.

(15) Fiberduct Data Manual #18-142UF—Complete catalog information on G-E Fiberduct wiring. Contains 48 pages of products, specifications, installation data, dimensional drawings, and illustrations.

(16) Selection of Proper Cable Sizes Booklet #19-269 — dimension, voltage drop, and current-capacity charts make this booklet a handy reference for many power cable selection problems.

(17) Watch Dog* Starter Folder #16-552 — lists Watch Dog "no-blink" fluorescent starter types and sizes, explains Watch Dog advantages.

(18) How to Wire and Estimate Q-Floors #18-90-2 UF—concise folder gives estimating and installation advice for Q-Floor raceway layouts. Complete with drawings and jobsite photographs.

(19) Magnet Wire Bulletin #19-100—nutshell summation of G-E Formex* and Deltabeston* magnet wires.

(20) How to Install G-E Fiberduct, #18-151UF — Concise folder explaining recommended methods for installing G-E Fiberduct raceway systems.

(21) Your Stake in Q-Floor Wiring #18-110UF—a well-illustrated booklet that asks and answers, in simple and interesting terms, questions you may have about G-E Q-Floor raceway systems.

(22) Heating Cable Set Folder #16-742—shows the three main uses of these handy heating cable sets: roof de-icing, water pipe protection, and soil heating.

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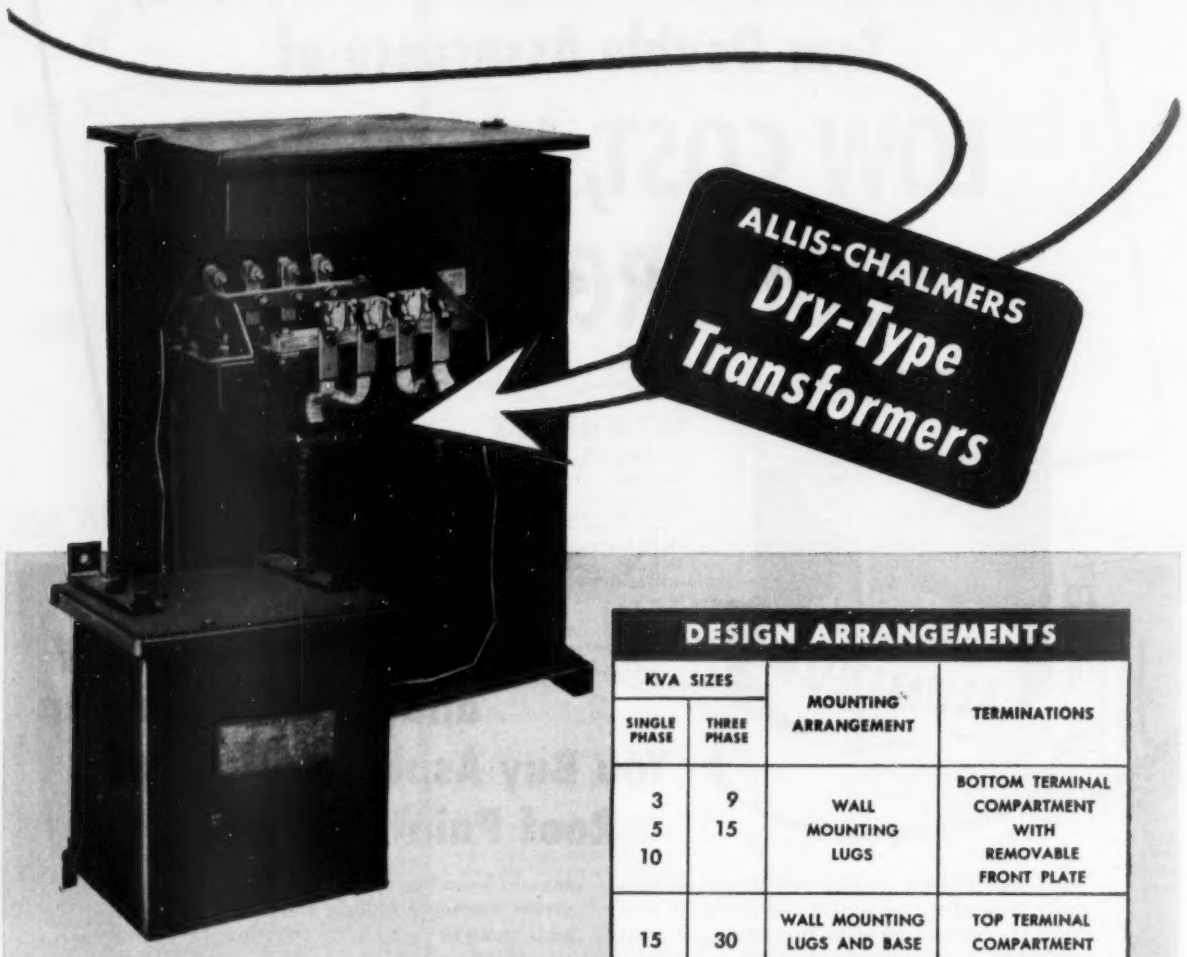

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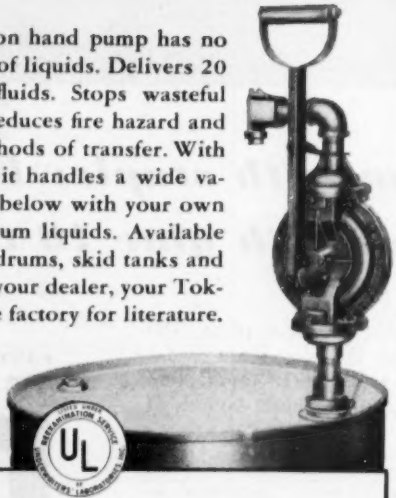

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Begins on page 154

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8 Cranes
Bulletin SR-101 describes top-running and under-running cranes that incorporate the features of a lift truck. Photographs of typical applications, including auto-body handling and pallet and skid storage. 16 pages. Chicago Tramrail Corp.

9 Handling Equipment
Fork trucks, high-lift trucks, pallet trucks, electric and hand-lift trucks, portable cranes, and steel storage racks are among the many types of handling equipment illustrated and described in this 100-page, handy pocket-size catalog. Capacity data. Catalog 535. Barrett-Cravens Co.

10 Fork Lift Trucks
A "driver's eye view" of the operation, construction, and servicing features of maker's complete line of fork lift trucks is one of the highlights of this 36-page bulletin. Many photographs help you to select from both diesel and gasoline-powered models. Capacity data and specs. No. 1462. The Buda Co.

11 Trucks, Pallets, Storage Bins
Form 31 features over 100 illustrations of handling equipment, including bins, racks, floor trucks, trailers, and dump hoppers. Helpful hints on how to select; case studies on actual installations. 32 pages. Fab-Weld Corp.

12 Fork Lift Truck
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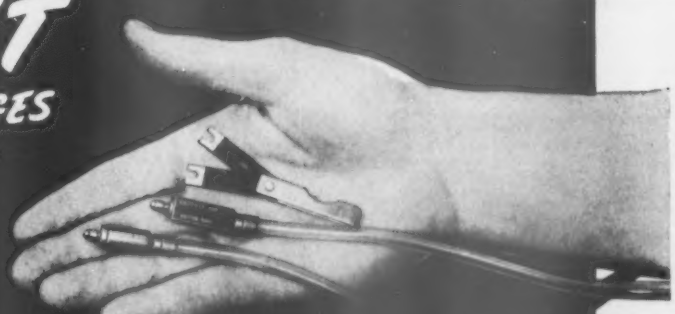
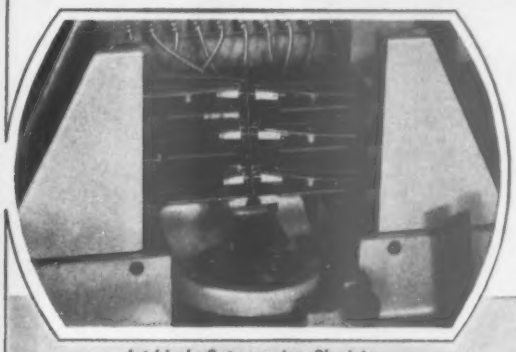
GAGING CARTRIDGES



Plunjets with Precisionaire for checking jet engine blades.



Jet blade fixture using Plunjets.

PLUNJET GAGING CARTRIDGES . . . the self-contained gaging heads you can use practically everywhere, were developed by Sheffield in 1949.

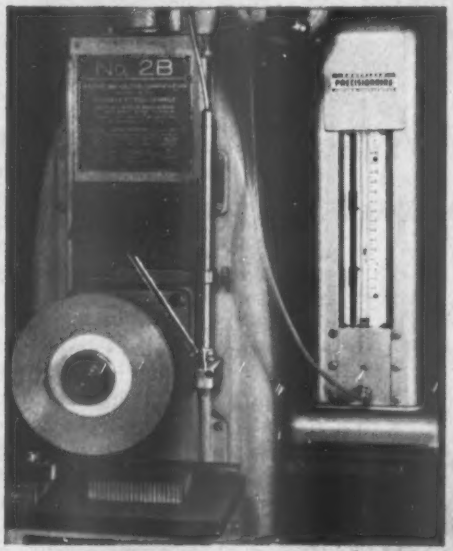
THOUSANDS ARE NOW IN USE on a wide variety of gaging fixtures and machine control applications.

MORE THAN FIVE THOUSAND are used on gages for checking jet engine blades.

PLUNJET GAGING CARTRIDGES ARE STANDARD LOW-COST STOCK ITEMS which can be applied by users to practically any gaging fixture or machine tool control where indication is required.

***WRITE FOR ENGINEERING DATA** giving ranges, amplifications, applications, mounting dimensions and prices.*

IMMEDIATE DELIVERY FROM STOCK



Plunjet feed gage enables operator to grind to a degree of accuracy previously impossible.

6302

SHEFFIELD HEADQUARTERS

the **Sheffield** corporation

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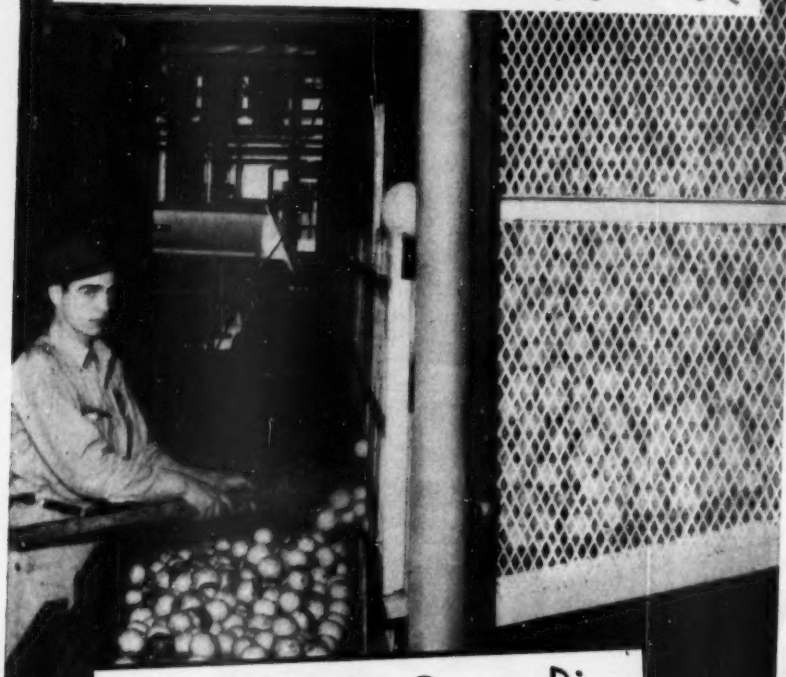
IT'S WHEELING EXPANDED METAL

SOLID STEEL ...PIERCED ...AND S-T-R-E-T-C-H-E-D



Air Conditioning Orange Bins with **SOLID STEEL!**

That's right, *solid steel* pierced and e-x-p-a-n-d-e-d to form an open diamond pattern that allows free air circulation around fruit in storage. In addition, these bins of Wheeling Expanded Metal provide full visibility of bin contents, easier cleaning, and complete weather and fire resistance.

Wheeling ExM may well be the answer for *your* product . . . *your* plant. It's the versatile metal of 1,001 uses, wherever you want the strength of solid steel, plus free passage of heat, light, sound and air! Write today for full details.

Photo: Orange bins at Plymouth Citrus Products Cooperative, Plymouth, Florida.

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Free NEW CATALOGS

Begins on page 154

PIPELINES AND FITTINGS

13 Pipe Fabrication and Equipment Weldments

Form No. W-52553 (16 pages) tells the advantages of steel equipment weldments and fabricated pipe. Includes section on comparative properties of steel vs. cast iron. Illustrations. Struthers Wells Corp.

14 Heating Coils

This catalog gives you the story on standard and special-purpose heating coils. Construction and performance data; hints on how to select. 36 pages. No. 4553. Young Radiator Co.

15 Fabricated Alloy Valves

4-page folder describes maker's line of steel, stainless steel, monel, and nickel alloy valves for use on pulp, liquor, vapor, sea water, and various corrosive liquids. Illustrations, including models with cylinder or motor controls. Fabri-Valve Co. of America.

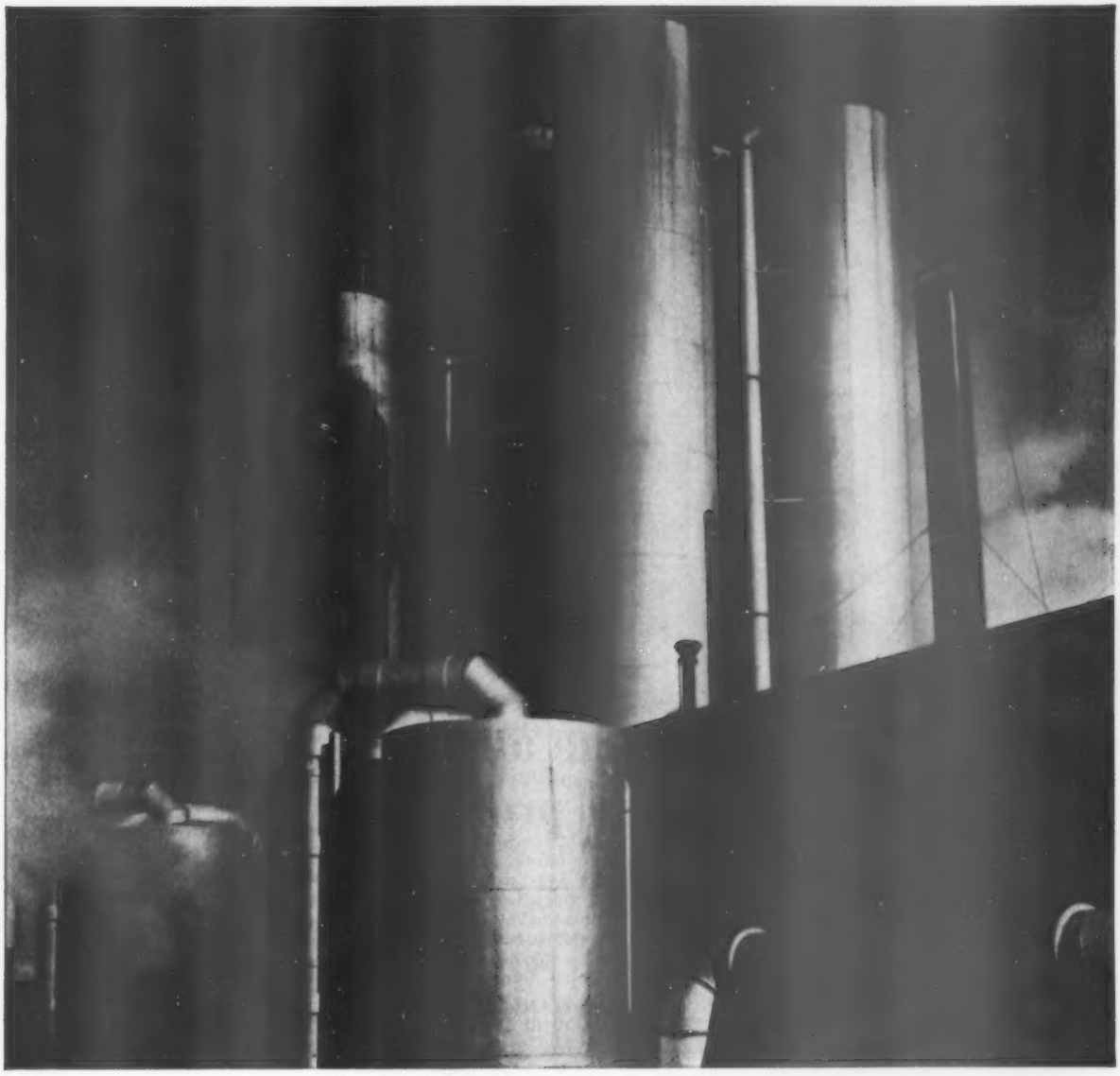
16 Gear Pumps

You can look at a full line of gear pumps for wide range of viscosities and capacities in this 24-page bulletin. Illustrations, dimensions, and capacity tables. Tells how to select the proper pump for your specific application. No. 17A. Schutte & Koerting Co.

17 High-Vacuum Pumps

A 34-pager covers high-vacuum pumps. There are vacuum formulas, constants, and conversion factors. Includes useful information on selection and maintenance. Engineering drawings and pressure charts. No. 750. F. J. Stokes Machine Co.

Turn the page



There's a special paint for places like this and it saves hundreds of dollars

When you get down to figuring how much it costs to paint a square foot of tank or stack, you find that the paint itself is only a small part of the cost. That's why experienced paint buyers select more quality aluminum paints for jobs like this than any other type.

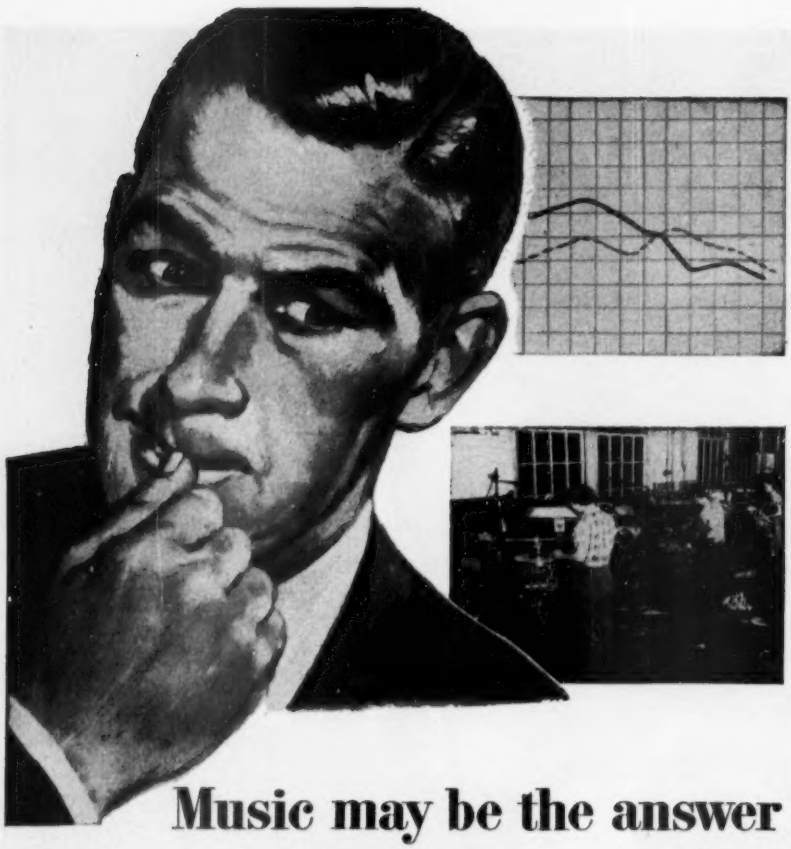
Because so much aluminum paint is used for these places, special formulas have been developed. Paints made to these formulas stand up longer under heat, cold, sun, rain and the kind of corrosive fumes you find around mills and factories.

We don't make paint. But we make the Alcoa Aluminum Pigments that are used in more aluminum paints than any other brand. So we want to be sure that you get full value from the aluminum paint you buy. It's just good business for us.

If you have a plant, or a stack, or storage tanks, or most anything else that needs paint that will last a long time, write us about your paint problem and we'll tell you what types of aluminum paints are best. We'll also send you a copy of *Painting with Aluminum*. It's packed with facts on selecting and using aluminum paints. Paint Service Bureau, Aluminum Company of America, 1792-J Alcoa Building, Pittsburgh 19, Pa.

Alcoa Aluminum

ALUMINUM COMPANY OF AMERICA



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SOUNDS FARFETCHED . . . but the figures will surprise you. Checks on plants using work-music supplied by RCA Sound showed these amazing results:

1. **One plant operator estimated every dollar invested in work-music has saved him $84.00. More than 8,000 man-hours saved in 7 months**
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3. **In an experiment in a plant using RCA Sound, music was shut off for a month . . . productive efficiency dropped 18%.**

Look into RCA Sound for improved production administration

In thousands of plants RCA Sound is at work every day as a paging system, public address system, and as a source of improved employee attitudes. True, enjoyable reproduction makes it a favorite with employees. RCA engineering and service have made it the choice of management over all other makes. RCA's broad technical and practical background offers all the benefits of comfort-engineered sound—eliminates the discomforts of poor sound performance.

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When you select RCA Sound, you get the economy of a custom-made system built from standard components. RCA sound systems have the flexibility you need to meet any plant layout requirement—to do any sound reproduction job you want.

Contact your RCA Sound distributor for details on RCA Sound and the nation-wide facilities of the RCA Service Company. Or mail the coupon today. **MAIL COUPON NOW**

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RCA **RADIO CORPORATION of AMERICA**

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Free NEW CATALOGS

Begins on page 154

MECHANICAL EQUIPMENT

18 Roller Chains and Fittings
A 56-pager showing chains, sprockets, idlers, and spray nozzles for your transmission machinery, conveyors, and processing equipment. Photographs, specs. No. 53-110. Chain Belt Co.

19 Air Compressors
Form E-251 (8 pages) tells you about 7 models of air compressors, 10-100 hp., with displacements of 55-540 cfm. Features, mounting hints, and specs. Includes table of industrial tools which can be operated by each size compressor. Davey Compressor Co.

20 V-Belt Drives
Complete selection tables and application data on maker's V-belt drives can be seen in this 56-page catalog. Illustrations show construction features and component parts. Dimensional diagrams, engineering data, and weights. No. V-1000. Pyott Foundry and Machine Co.

21 Bearings
Handy pocket-size catalog of standard stock bearings, bars, and electric motor bearings. Numerous illustrations, dimensional data, and weights. 66 pages. No. 152. Bunting Brass & Bronze Co.

22 Industrial V-Belts
A 60-page engineering catalog for maintenance engineers on industrial V-belts and their application. Includes new hp. ratings approved by the Rubber Mfrs. Assn., and revised pre-engineered drive tables. Sections on open-end and link-type V-belting. Durkee Atwood Co.

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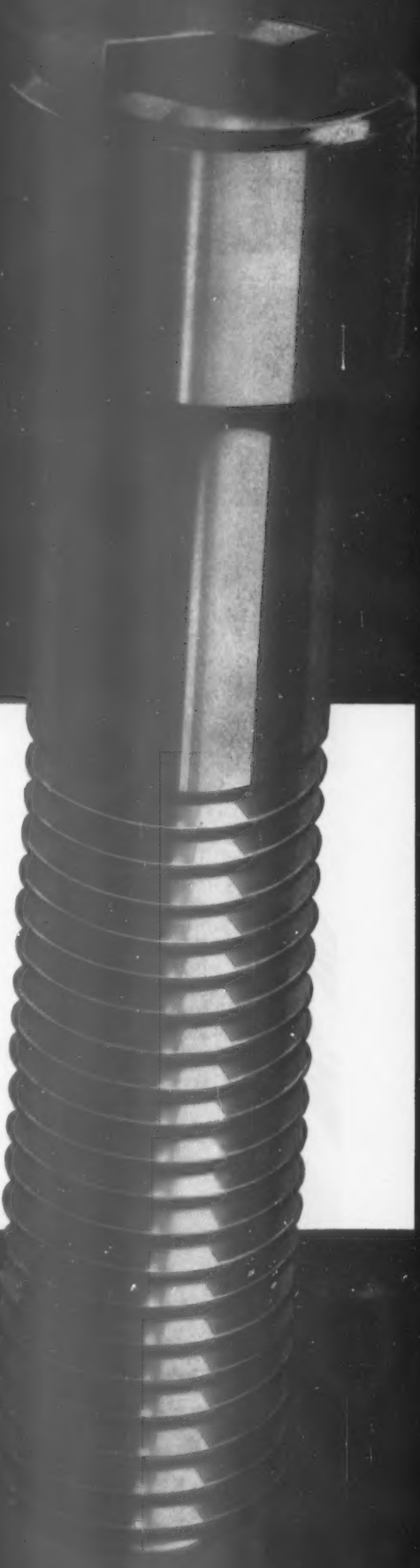
EXTRA *inventory*

EXTRA *men*

EXTRA *service*

at no extra cost . . .

YOUR B-RIGHT-ON SOCKET SCREW DEALER



Sure, you expect delivery and service from your industrial distributor, but you will find there's something EXTRA about the service from your Brighton Socket Screw Distributor—an extra interest in your fastener needs, extra desire and ability to fill those needs.

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THE BRIGHTON SCREW & MANUFACTURING COMPANY

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The job goes quicker —and with less effort when the pliers are Kleins. Workers appreciate the hand fit of the handle and proper balance—the keen knives that stay sharp even after long service. In the complete Klein line of pliers, you'll find a type exactly suited to *your* needs.

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IMPORTANT NEW Free CATALOGS

Begins on page 154

MISCELLANEOUS

23 Maintenance Equipment
48 pages of sanitation and maintenance products for all industrial plants. There's a complete explanation on each product, what it is, how it works, where and how to use it. Includes sections on soap dispensing equipment and insecticides. Huntington Laboratories, Inc.

24 Tool Holder
5-page folder gives you a picture story of a tool holder that can be used in a number of machining operations. Shows models available; specs and prices. KDK Products.

25 Planning and Control
"Assured Equipment Productivity Through Maintenance Management" is the title of this 8-page booklet to assist you in planning repair functions, construction and preventive programs. Flow charts help schedule maintenance work. Remington Rand Inc.

26 Water Treatment
A complete line of instruments for use in water, sewage, and industrial waste treatment can be seen in this 24-page bulletin (No. 7302). Many photographs of existing installations, composite flow, and schematic diagrams show various treatment processes. Minneapolis - Honeywell Regulator Co.

27 Scaffolding
You learn about scaffolding with only one basic part in this 4-page folder. Step-by-step illustrations show how it is assembled. Brainard Steel Div.

28 Blowers
This 32-page bulletin features centrifugal blowers and exhausters for air or gas handling. Illustrations of many models. Ratings and dimension tables. Specs. B-6. Lamson Corp.

For catalogs 29 through 46, see Plant Engineering Problems, page 282, and Plant Operating Problems, page 288.

DUPLICATE COUPON ON PAGE 154

MAIL THIS COUPON FOR FREE CATALOGS *(Good until Nov. 30, 1953)*

FACTORY MANAGEMENT & MAINTENANCE (September 1953)
330 W. 42nd St., New York 36

I'm circling the numbers of the catalogs and bulletins I want:

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ACCO products

With these Parts YOU can assemble ACCO Registered Wire Rope Slings for 85% of your lifting requirements

DUALOC means dual lock. Two steel collars securely swaged around the ending double your security. Don't distort rope. Give full rope strength. Warranted by ACCO.

● Now you can buy ACCO *Registered* standard stock parts from which you can make infinite combinations of wire rope slings. If a new lifting job develops, you most likely can handle it with a different hook-up of the same standard ACCO *Registered* parts you use for regular lifts. But if you should need longer legs, or heavier legs, that's no problem either because everything you need is . . .

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ACCO offers you a complete line of links, safety shackles and hooks. These items are all *Registered* and *Warranted* to have the same strength and dependability as the slings they are to be used with. ACCO *Registered* Wire Rope Slings are the best wire rope slings made.

***Find Out Now** what you can do with ACCO Registered Wire Rope Slings. See your ACCO Sling distributor or write our Wilkes-Barre, Pennsylvania, office for literature.*

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WIRE ROPE SLING DEPARTMENT
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Wilkes-Barre, Pa., Chicago, Denver, Houston, Los Angeles, New York, Odessa, Tex., Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

ACCO Registered Wire Rope Slings

There ain't no Mower!

Bolts and nuts are a "grass roots" necessity to the proper functioning of most mechanical products. Take away the bolts and nuts from a motor lawn mower, for instance, and literally "There Ain't No Mower"!

But in spite of their importance, the cost of the fasteners that go into a *single unit* of any product represent a small percent of its total manufacturing cost.

So it's just plain, good common sense always to use bolts and nuts you *know* are dependable as well as economical.

Lamson & Sessions, with 87 years of experience supplying industry with the best in fasteners, offer you unexcelled facilities to meet your bolt, nut and screw requirements.

Remember, it's *pleasant* and *profitable* to do business with Lamson & Sessions.

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1971 West 85th St. • Cleveland 2, Ohio
Plants at Cleveland and Kent, Ohio • Birmingham • Chicago

FOR PROMPT DELIVERY AND HELPFUL SERVICE, ORDER FROM YOUR LAMSON DISTRIBUTOR

MACHINE SCREWS AND NUTS
Precision made for fast, economical assembly.

PLUG NUTS
Ideal for blind or hard-to-reach places.

TAPPING SCREWS
Choice of round, pan, truss, flat oval, hexagon and Phillips heads.

CAP SCREWS
Bright and "1035" Hi-Tensile Heat-treated steel.

SQUARE AND HEX NUTS
Semi-finished, hot pressed, cold forged.

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Economical, vibration proof. Can be used repeatedly.

COTTER PINS
Steel, brass, aluminum and stainless steel.

"1035" SET SCREWS
Cup point type, hardened and heat-treated.

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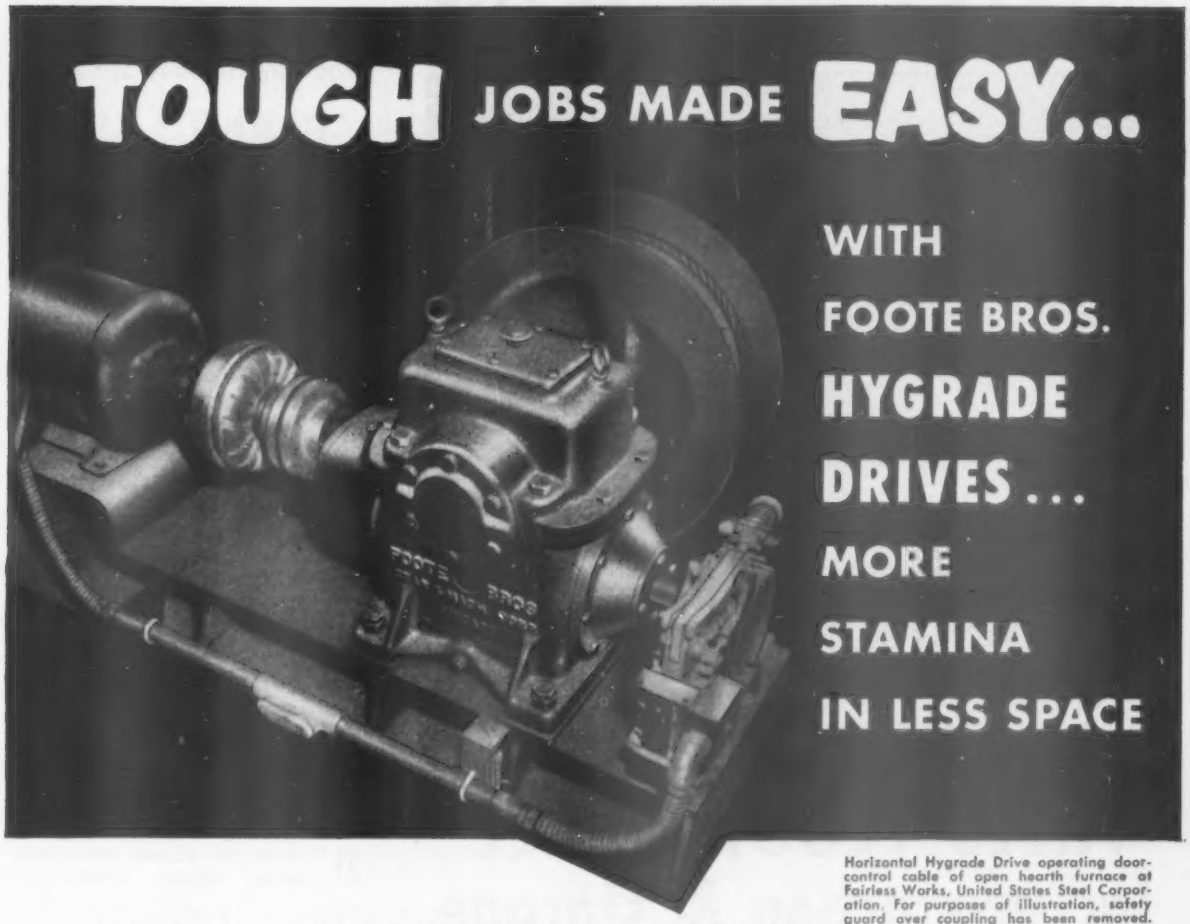


WITH FOOTE BROS. HYGRADE DRIVES... MORE STAMINA IN LESS SPACE

Horizontal Hygrade Drive operating door-control cable of open hearth furnace at Fairless Works, United States Steel Corporation. For purposes of illustration, safety guard over coupling has been removed.

Steel making is a rugged, 'round-the-clock job. And Foote Bros. Hygrade Drives have the stamina for such typical, tough service — like this Hygrade at U. S. Steel's Fairless Works.

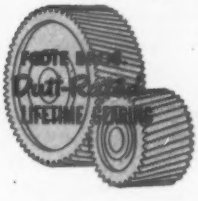
Sturdy, compact Hygrade Drives are built especially for heavy-duty applications — ratios range up to 4,108 to 1, capacities up to 260 h.p. But Enclosed Hygrade Drives are also designed to meet area limitations — modern, space-saving housings have been engineered around new-process, high-efficiency worm gearing to assure maximum performance in minimum space.

For optimum load-carrying capacity — for maintenance-free operation — for day-after-day service under the most rugged conditions... select Foote Bros. Hygrade Worm Gear Drives. There's a complete line — a size and type to meet all your requirements. Available with either horizontal or vertical output shaft. For special applications, Vertical Hytop Hygrade provides a long, extended, output shaft without additional support. For prompt delivery, call your Foote Bros. representative or write for bulletin.

Line-O-Power Drives

Foote Bros.-Louis Allis Gearmotors

Maxi-Power Drives



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Better Power Transmission Through Better Gears

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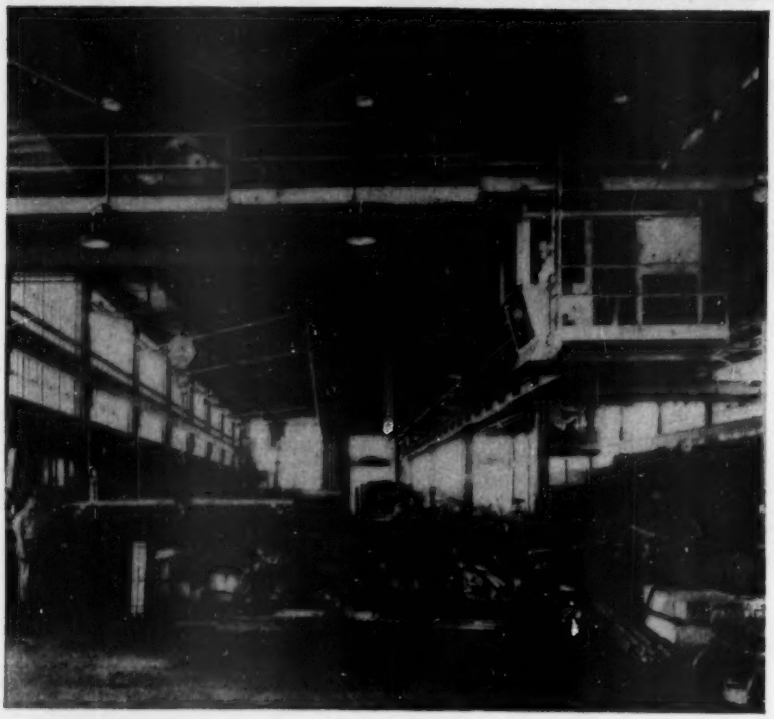

FREES FLOOR SPACE for production & storage

Why waste space that's suitable for production or storage on floor-level systems of handling! Let a Shepard Niles Crane put unused ceilings to work—you'll speed production, eliminate re-handling, move heaviest loads safely, at low cost.

Thrifty through-the-air handling can make more space in your plant. But be sure you choose the right crane! Ask the Shepard Niles representative to show you data on installations similar to yours—help you select the correct equipment. Write today for Bulletin describing Shepard Niles Cranes—and arrange to have a representative call.

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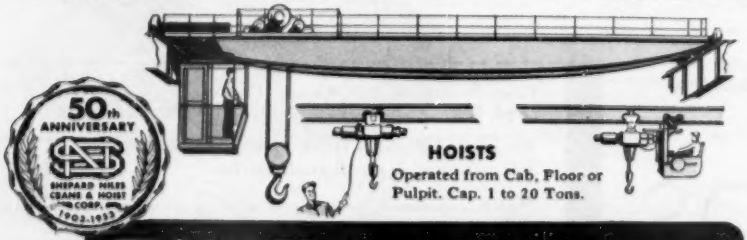
Overhead: Top Running, Inner Running, Under Running, Floor or Cab Operated. Cap. 1 to 450 Tons.



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Operated from Cab, Floor or Pulpit. Cap. 1 to 20 Tons.

SHEPARD NILES
CRANE AND HOIST CORPORATION

1131 SCHUYLER AVENUE, MONTOUR FALLS, N.Y.

Good Ways to Solve Special PLANT ENGINEERING PROBLEMS

To get these catalogs, circle numbers on coupon, page 154 or 278.

29 HOW TO CHECK THE COST OF LPG CONSUMPTION is the subject of the Rockwell Manufacturing Co.'s 8-page Bulletin No. OG-250. Shows how metering of liquefied petroleum gas gives accurate measurements.

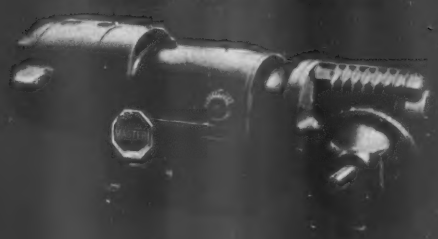
30 GOT A ROOF REPAIR PROBLEM? A 32-page brochure by the Tremco Manufacturing Co. is crammed full of information that will be helpful in solving your roof troubles. These data are based on the company's field experience and are illustrated by photographs, drawings, and diagrams.

31 HOW TO CLEAN OUT STUBBORN DRAIN STOPPAGES: Here's a tool that won't cause pressure leaks. Hydraulic Manufacturing Co.'s 6-page booklet tells how its Hydraulic Water Ram operates on the impact principle. Unskilled labor can use it. Works on pipes up to 6 inches in diameter.

32 IS YOUR VENTILATION SYSTEM BUCKING YOUR EXHAUST SYSTEM? Problems resulting from the relationship of exhaust and make-up air systems, and their bearing on the heating load are discussed in a 4-page bulletin, No. 115, of the National Assn of Fan Manufacturers, Inc.

33 ARE YOU OVERLOADING YOUR SHOP CRANES? Electronic crane scales can eliminate this dangerous practice. Bulletin No. 4105 of the Baldwin-Lima-Hamilton Corp. illustrates typical installations and uses. Available in portable floor unit or built-in cab model.

Turn the page



Don't put up with make-shift assemblies when it is so easy to get the RIGHT horsepower, the RIGHT shaft speed, the RIGHT construction features, the RIGHT mounting . . . all combined into one compact power package.

Master Motors are available in thousands on thousands of types and ratings (up to 400 HP) giving you a selection you can get nowhere else. This permits you to choose a power drive for each job that's just right . . . a power drive that will add greatly to the compactness, appearance, safety, and economy of each of your motor applications.

See how the designer of this tobacco processing machine has used two different Master units that are just right for his purpose . . . one, a motor with a variable speed unit and a right angle worm gear, the other a motor with a variable speed unit and a parallel shaft gear reduction unit.

you can always be right

Select the RIGHT power drive from Master's broad line and you can increase the saleability of your motor-driven products . . . improve the economy and productivity of your plant equipment. That's the horsesense way to use horsepower.

THE MASTER ELECTRIC COMPANY • DAYTON, OHIO

if it's blast cleaning –

look to VACU-BLAST

for the answer

From huge locomotives to small precision parts — or for routine plant maintenance work — there is a Vacu-Blast product designed to suit your blast cleaning needs. In addition to the products listed below, Vacu-Blast also designs and manufactures specialized blasting equipment to handle specific cleaning problems. For the right answers to your blast cleaning questions, it pays to check Vacu-Blast first!

the vacu-blaster

for dust-free blast cleaning

Makes possible abrasive blasting anywhere in your plant while eliminating cleanup costs. The nozzle releases an intensive stream of air and abrasive through the center cone of the gun. Used abrasive and debris are picked up by the vacuum return around the edge of the gun. A surrounding brush admits air, preventing the escape of any dust or grit. Spent abrasive and debris are carried off to a reclaimer unit which separates and reuses the cleaned abrasive over and over for maximum economy; dust is filtered by a dust collector unit which releases only clean air. The entire machine is portable for use where needed.

Belmont Sand Blaster — A low-cost unit for conventional sand blasting operations. Features include a simple bronze and stainless steel mixing valve and a simple air-operated filling valve. Available with single or double chamber and in portable or stationary models, and with manual or full automatic remote control.

Belmont Blast Cabinets— For blast cleaning of small parts within a completely enclosed system. A steady stream of abrasive is impelled against the work by an "annulus type" suction blast nozzle. Pistol-grip blast gun offers easy, balanced operation, finger-tip control.

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Belmont Blast Rooms — Designed and built to order for handling vehicles, castings or any type of large assembly requiring blast cleaning.

Belmont Supersonic Nozzle — A major advance in blast cleaning, this nozzle incorporates a new type shape. Provides greatly increased muzzle velocity with no increase in amount of air and abrasive used. Actual tests on rusted and painted surfaces prove that it does as much as 25% more work in the same time as standard types. Made of wear-resistant tungsten carbide for longer life.

Mail coupon now for details on these machines or for other information pertaining to your blast cleaning problems.

VACU-BLAST CO. INC.

P. O. BOX 885-G BELMONT, CALIFORNIA

Please send me information on:

- ☐ Vacu-Blaster
- ☐ Belmont Sand Blaster
- ☐ Belmont Blast Cabinets
- ☐ Belmont Wet Blast Cabinets
- ☐ Belmont Blast Rooms
- ☐ Belmont Supersonic Nozzle

NAME

POSITION

COMPANY

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CITY ZONE STATE

I am interested in blast cleaning for

Begins on page 282

Good Ways to Solve Special PLANT ENGINEERING PROBLEMS

To get these catalogs, circle numbers on coupon, page 154 or 278.

34 HOW TO SALVAGE SHORT LENGTHS OF LEFT-OVER PIPE. Convert them into usable nipples. Beaver Pipe Tools, Inc., tells how in an envelope enclosure on its Universal Nipple Chuck. Handles pipe size ⅛ to 2 inches.

35 FOR FAST AND ACCURATE FLAME-CUTTING OF CURVES or straight lines try the New Era Engineering Co.'s cutting guides. In 4-page bulletin, No. 101, it describes and illustrates a complete line of cutting guides that will handle circles up to 66 inches in diameter, also angles, bevels, other shapes.

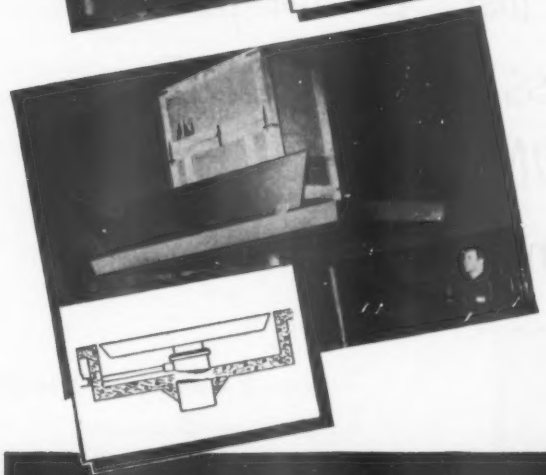
36 HOW TO SPEED UP A CALKING JOB: Save time and material with Force Flo's container-direct-to-gun loading device. Fits any standard calking gun. Two-page folder shows how to use.

37 CAN CENTRALIZED CONTROLS REPLACE COSTLY DECENTRALIZED MANIPULATIONS? Arens Controls, Inc., has just published a new catalog on push-pull controls. Contains data that may help you plan your control applications to cut labor costs.

38 NEED A FAST, RELIABLE TEST FOR ACIDS IN BOILER WATER? Hall Laboratories, Inc., a consulting firm on water problems, says it has two simple answers to this problem. Test with either a dropper or burette equipment and reagents takes 2 to 3 minutes, gives results reproducible to within 25 to 50 ppm. dissolved solids.

Turn the page

SAVE THE MAN IN MANUAL LABOR WITH Wayne LIFTS



SPEED PRODUCTION...SAVE LABOR ...CUT HANDLING COSTS

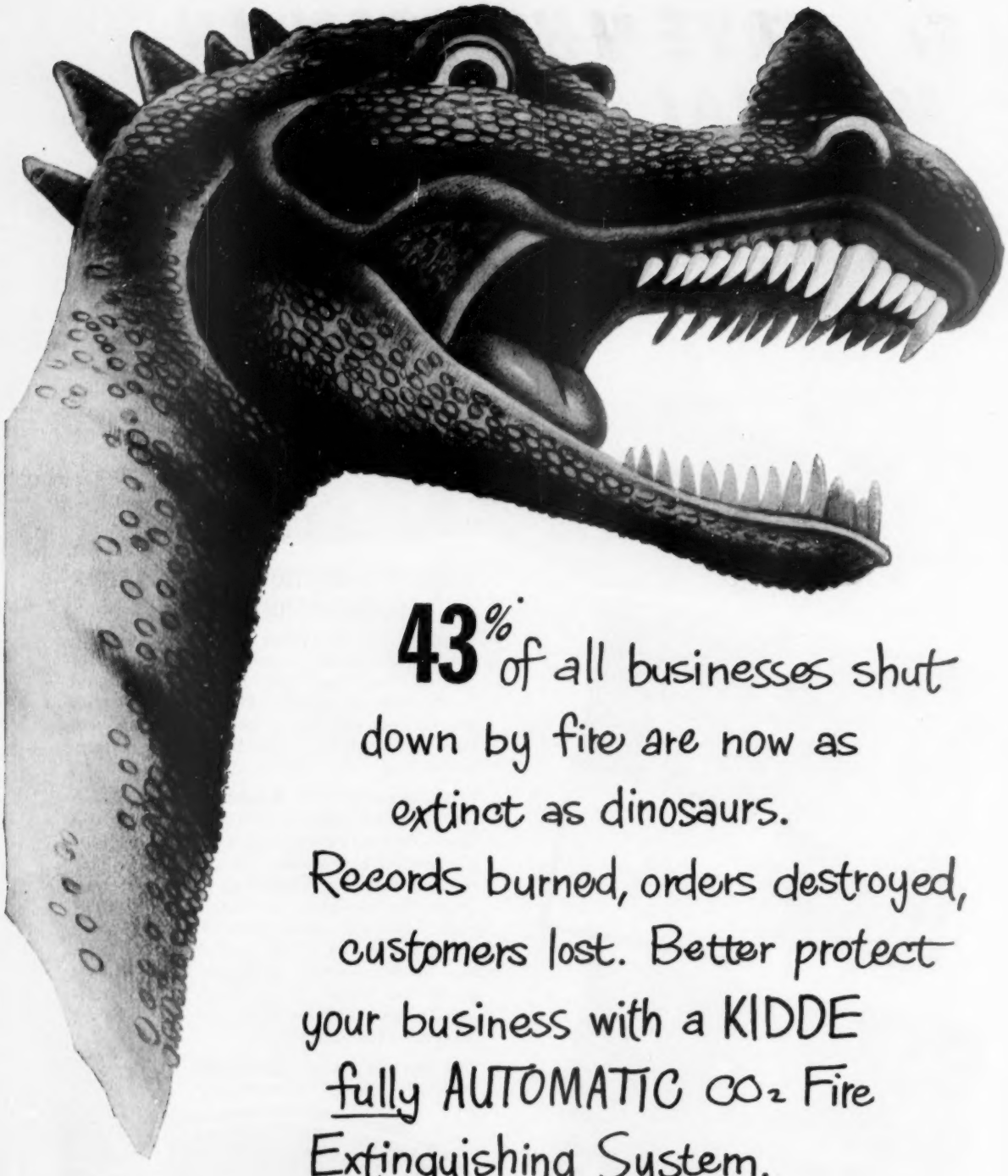
Loading or unloading, just back up the truck . . . push the button . . . and the Wayne Loading Dock Ramp is adjusted to the correct height. Hand or industrial trucks roll on easily. No chain lifts, pry bars or costly manual lifting operations necessary.

From coast to coast Wayne is cutting loading time as much as 75% with Loading Dock Ramps saving miles of round-about hauling with cross-over bridges . . . speeding up inventory stocking with platform lifts. Wayne Lifts include ramps, sidewalk elevators, materials lifts, cross-over bridges, service lifts and others. Each custom-engineered to meet your plant's particular needs. Write today for the new folder on "LIFTronics . . . science of materials handling."

THE WAYNE PUMP COMPANY
SALISBURY, MARYLAND • TORONTO, CANADA

Wayne
NATION WIDE SERVICE

WAYNE LIFT DIVISION, Salisbury, Md.



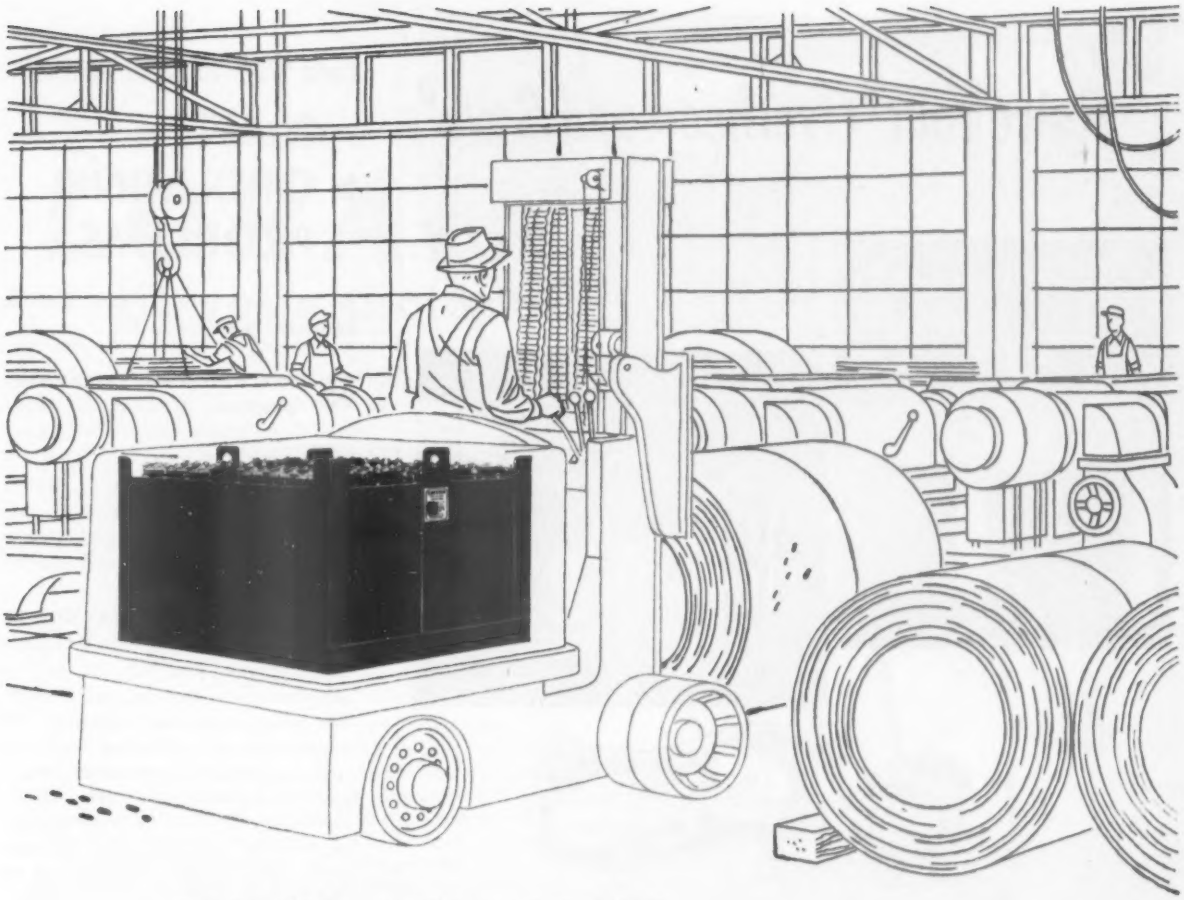
43% of all businesses shut down by fire are now as extinct as dinosaurs. Records burned, orders destroyed, customers lost. Better protect your business with a KIDDE fully AUTOMATIC CO_2 Fire Extinguishing System.

Kidde

Walter Kidde & Company, Inc.
932 Main Street, Belleville 9, N. J.
Walter Kidde & Company of Canada, Ltd., Montreal, P. Q.

*according to a survey by the Safe Manufacturers' National Association

The word "Kidde" and the Kidde seal are trade-marks of Walter Kidde & Company, Inc. and its associated companies.



Trucks driven hard, 'round-the-clock

need the plus-values in EDISON batteries . . .

EASILY EXCHANGED—QUICKLY RECHARGED—DOUBLY DEPENDABLE

When duty cycles for industrial trucks are longest and toughest, the *extra* advantages of EDISON batteries often become the *most essential*. Then, more than ever, EDISON batteries deliver the greatest value at any price.

In rugged 24-hour truck service, they can be exchanged in two minutes, fully recharged in 6 to 7 hours. They have no finish-rate limitations, require no equalizing. They are easily ventilated, too, if they must work in high temperatures.

In fact, EDISON batteries are so foolproof electrically that even such accidents as external shorts and reverse charging cannot injure them. Consider, also, their famous steel cell construction, another major reason for their unequalled stamina throughout a useful life two to three times that of other batteries.

EDISON *plus-values* are more fully covered in our bulletins S.B. 3808 and S.B. 2039. Write for them and the address of your Edison field engineer. Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J.

Most Dependable Power—
Lowest Over-All Cost
. . . you get both with an EDISON

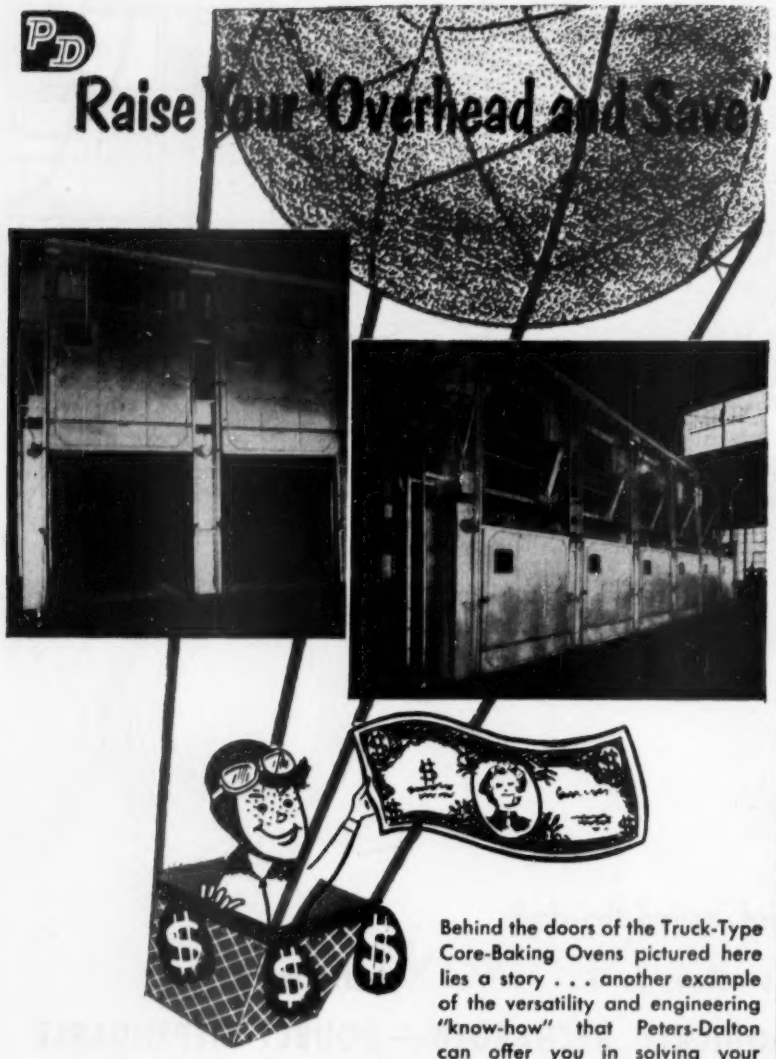
EDISON

Nickel · Iron · Alkaline

STORAGE BATTERIES

PD

Raise Your "Overhead and Save"



Behind the doors of the Truck-Type Core-Baking Ovens pictured here lies a story . . . another example of the versatility and engineering "know-how" that Peters-Dalton can offer you in solving your baking and drying problems. A manufacturer with limited floor space wanted core-baking ovens installed that would be easily and quickly accessible for plant trucks when handling cores for baking. PD engineers studied his production requirements and space limitations—designed and installed this cost-cutting, efficient and compact core baking system. Overhead doors lift automatically to permit truck placement of pallets in the spacious core ovens with this overhead installation. Handling time is cut to the minmum; the most is made of limited space.

PD engineering experience and production ability can open "doors" for you—doors that seem closed due to inadequate facilities, space limitations, or poorly designed equipment. PD engineers can design the oven best suited to your special requirements. For more detailed information—write, wire or phone.

Hydro-Whirl Paint Spray Booths *Industrial Washing Equipment*
Drying and Baking Ovens *Hydro-Whirl Dust Collecting Systems*

PD Peters-Dalton INC.
17918 Ryan Road • Detroit 12, Michigan

Good Ways to Solve Special

▶ PLANT OPERATING PROBLEMS

To get these catalogs, circle numbers on coupon, page 154 or 278.

39 FOR AUTOMATIC SPRAY-DECORATING, Conforming Matrix Corp. has recently developed a machine that's electrically dial-controlled for loading or dwell time and gun-spraying time, all within a tenth of a second. It can paint from zero to a 24-in. stroke.

40 TO REDUCE EYE FATIGUE IN INSPECTION, Main Belting Co. suggests you use its green, abrasion-resistant conveyor belt. The color increases efficiency in assembling or inspecting such objects as radio chassis, tubes, small parts assemblies, shells—wherever a great deal of visual concentration is required. Green belts come in any widths, up to 132 inches.

41 WANT TO MODERNIZE PRODUCTION SCREWDRIVING? Why not take a look at Apex Machine & Tool Co.'s 60-page Catalog No. 21. You'll find its complete line illustrated and described: Bit holders and insert bits, power bits, hand drivers, offset drivers, and finder sleeve assemblies. Also a section on combination tools.

42 HOW TO CONTROL INVENTORY WITH A TYPEWRITER: International Business Machines Corp. says it can show you how. Punched cards for inventory control can be produced from a perforated tape created simultaneously with the typing information on IBM's new Typewriter Tape Punch. Information recorded in perforated tape is then automatically transferred into punched cards through a companion device. Form No. 32.

Turn to page 288

Q. Where does a LORAIN fit your picture?

You name it! There's hardly a lifting, loading, material handling problem that cannot be handled profitably by Lorains.

These four pictures illustrate the point. From raw materials out of the ground to final product shipping, Lorains are serving and saving for thousands of industries. Many benefit particularly from the saving of high-speed mobility, the ability to move anywhere, any time, inside or outside the plant. Lorain rubber-tire mountings make that saving possible. There is another big saving in handling any size, type or shape of material. You can use bucket attachments to dig materials, or a wide assortment of more than 16 lifting devices to handle anything from wood crates to steel bars.

In addition to savings in time and manpower, you can streamline yard storage by higher stacking, fewer aisles and longer reaches with Lorain cranes. And there is an extra bonus in the work a Lorain can do on the many construction and maintenance jobs that confront every plant.

No matter whether your problem is raw materials, processing, shipping or plant maintenance, your local Thew-Lorain Distributor can provide you with money-saving, time-saving facts for your plant.

A. *All the way—start to finish!*

THE THEW SHOVEL CO., LORAIN, OHIO

THEW LORAIN®

CRANES FOR INDUSTRY

don't slip up on Safety

USE FERA-MAT OR FERROX

Slips are costly . . . and far too frequent. In fact, they cause one in six of all disabling accidents. You don't have to put up with greasy, oily, hazardous floors. The cure is simple . . . and economical. For safety underfoot, use easy-to-apply Fera-Mat or Ferrox floor coverings.

FERA-MAT facts

- Peel it...roll it...and walk on it in safety.
- Comes in 6" x 24" cleats that are ideal for stairs.
- Covers large floor areas quickly... cuts costs.
- Goes down on any clean surface... and stays there.
- Diamond-hard surface, yet easy to clean.

FERROX facts

- Open the can...trowel it on... ...say so-long to slips.
- Perfectly suited for machine areas and uneven surfaces.
- Gives excellent coverage...40 square feet to gallon.
- Really sticks...resists oil, chemicals and weather conditions.
- Costs ⅓ as much as fabric-backed floor coverings.

AB-100

Take your choice of either FERA-MAT or FERROX, depending on your plant conditions. Look into American Abrasive's line of non-slip treads, plates and gratings. *Fact Folder on Safety Floorings contains data on Fera-Mat, Ferrox, Fera-Flow, Fera-lun, Bronzalun, Alumalun. Send for your copy.*

AMERICAN ABRASIVE Safety Floorings

AMERICAN ABRASIVE METALS CO. • IRVINGTON 11, N. J.

Begins on page 288

Good Ways to Solve Special PLANT ENGINEERING PROBLEMS

To get these catalogs, circle numbers on coupon, page 142 or 253.

43 **FOR FASTER GAGING,** try Multichek, says Sheffield Corp. For one manufacturer, it simultaneously inspects five bearing diameters on a drive shaft, and indicates results on panelboard. You can inspect shafts at a rate of 600 to 800 per hour at 100% efficiency. Operator needs no special skills to operate it.

44 **HOW TO AUTOMATE YOUR RESISTANCE WELDING:** Taylor-Winfield Corp. says it can help, whatever your production problem. Bulletin No. 535 gives you 7 case studies to show how its custom-built installations have cut costs for a variety of manufacturers. Photographs illustrate each.

45 **WHEN SPRAY PAINTING OF SMALL PARTS GETS TOO COSTLY,** why not try tumble-painting, says Tumb-L-Matic, Inc. One manufacturer made savings of 81% by tumbling. Bulletin tells how, and offers free paint-tumbling test facilities to manufacturers who paint small parts in quantity.

46 **FOR QUICK CODING OF SMALL-GAGE WIRES** on electrical and electronic equipment, tiny pressure-sensitive markers have been developed by Western Lithograph Co. The ¾-in.-long markers are center die cut and mounted on pocket-size backing cards for quick removal. They make wire identification fast and eliminate the need for trimming large markers to size. Available in over 1000 codes, including A.S.A. and NEMA specifications.

...with TYCOL lubricants on hand!

A Cutting Oil with a "Delicate" Touch! Screw threading to fine tolerances is the acid test of any cutting oil . . . one reason why we ask: can your present oil measure up to Tycol Angrove 40? Take the customer who was threading 3/8" standard threads on 303 Stainless . . . with thread extending to the head . . . and the overall job calling for an extremely fine finish. The best of the competitive oils used yielded only 600 pieces before serration and burring appeared, necessitating regrinding the chaser. Tycol Angrove 40 produced some 4,500 pieces with no defects apparent under magnification . . . and with no regrinding of the chaser throughout the entire run! If you can't top this – contact your local Tide Water Associated office for further information!

Over 300 Tycol industrial lubricants are at your disposal . . . engineered to fit the job!

REFINERS AND MARKETERS OF VEEDOL . . . THE WORLD'S MOST FAMOUS MOTOR OIL

TYCOL
INDUSTRIAL LUBRICANTS

Boston • Charlotte, N. C. • Pittsburgh
Philadelphia • Chicago • Detroit
Tulsa • Cleveland • San Francisco
Toronto, Canada

TIDE WATER ASSOCIATED OIL COMPANY
17 BATTERY PLACE · NEW YORK 4, N. Y.

BUS DUCT IS FLEXIBLE

3 men install 755 ft. of BUS DUCT in 4 days at Lapointe Machine Tool Company

Secondary power distribution for a plant expansion was no problem for Lapointe Machine Tool Company, Hudson, Mass.

Westinghouse Plug-in Bus Duct was selected—and installed in record time! Three men using a fork truck completed the 755-ft. installation *in just four days.* The savings paid for an additional lighting job.

The flexibility of plug-ins every foot saved production, too. With power taken temporarily from the duct, they moved 139 machine tools with less than five minutes down time per operator.

Prefabricated in any length up to ten feet, Westinghouse Bus Duct installs easily with sliding-type cantilever hangers. Duct is fully salvageable—can be expanded or relocated readily.

Up to 5000 amperes, Westinghouse Bus Duct has greater current-carrying capacity than any system of wireway, cable or conduit. Four types are available to handle all load conditions and service requirements.

Call your Westinghouse Representative for complete details or write for B-5835, Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Penna.

J-30128

APPARATUS DISTRIBUTOR WESTINGHOUSE

YOU CAN BE SURE...IF IT'S Westinghouse

DESIGN TESTED AND VERIFIED in the Westinghouse HIGH POWER LABORATORY

the practical answer to your rust problems indoors and out . . . . . so easy to use that one man often does the work of two.

RUST-OLEUM®

STOPS RUST!

Resists Rain, Snow, Heat, Fumes, Weathering, Salt Water, etc.

Rust-Oleum *cuts costly manhours!* Just scrape and wirebrush to remove rust scale and loose rust . . . then brush Rust-Oleum 769 Damp-Proof Red Primer *directly over the sound rusted surface.* Rust-Oleum finish coatings available in many colors, aluminum, and white give you *double protection.* Sandblasting and other costly preparations are *not* usually required. Specify Rust-Oleum . . . prompt delivery from Industrial Distributor stocks in principal cities.

RUST-OLEUM CORPORATION
2451 Oakton Street, Evanston, Illinois

FREE SURVEY: Ask a Rust-Oleum specialist to conduct a survey including actual applications, tests, and recommendations. No cost or obligation. See Sweets for nearest Rust-Oleum distributor or write for literature today.

FACTS

prove the economy of Rust-Oleum

Apply Directly Over Sound Rusted Surfaces—Brush Rust-Oleum 769 Damp-Proof Red Primer *directly* over *sound rusted surface* after scraping and wirebrushing to remove rust scale and loose rust. Sand-blasting, chemical pre-cleaning and other costly preparation methods are *not* usually required.

Available In Many Colors, Aluminum, and White, Brush, Dip, or Spray—Get *double protection.* Beautify as you protect with Rust-Oleum finish coats in the color of your choice.

Practical, Economical Answer To Your Rust Problem—Rust-Oleum resists rain, heat, fumes, sun, salt air, salt spray, and many chemicals — as well as condensation indoors.

Proved Throughout Industry For Over 25 Years—On tanks, girders, pipes, machinery, roofs, buildings, fences, stacks, throughout industry — Rust-Oleum has *proved* its capacity to stop rust for over *25 years.*

There is Only One Rust-Oleum

Distinctive as your fingerprint, Rust-Oleum is an *exclusive formula* developed by a Master Mariner during more than 20 years battling actual rust conditions at sea. It incorporates a *specially-processed* fish oil vehicle that will *dry, is odor-free, and is formulated in many colors.* Be sure you specify genuine Rust-Oleum to assure satisfaction. Accept no substitute.

ATTACH TO YOUR LETTERHEAD—MAIL TODAY!

RUST-OLEUM CORPORATION
2451 Oakton St., Evanston, Illinois

- ☐ Have a Qualified Representative Call
- ☐ Free Survey
- ☐ Complete Literature
- ☐ Nearest Source of Supply

Only THE DUMORE®

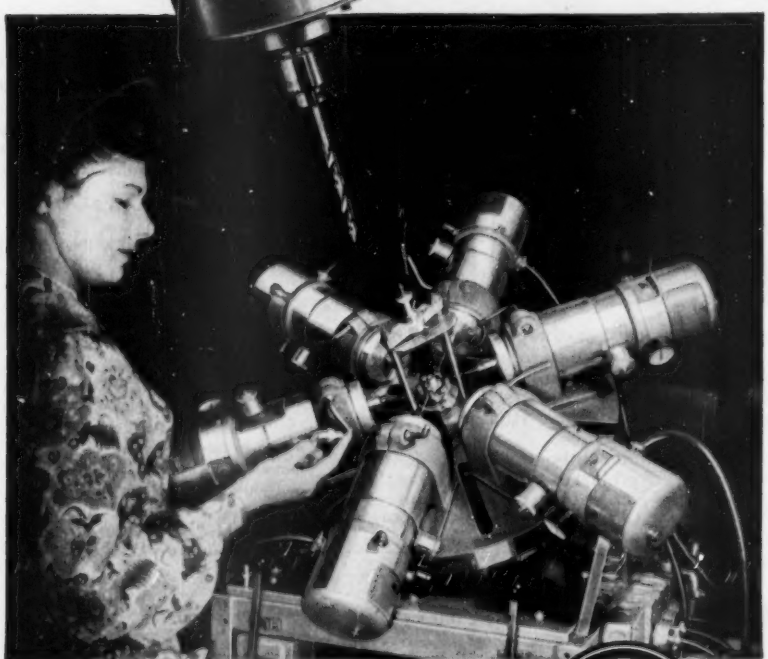
Automatic Drill Head offers the technique of "Resistance Drilling"... eliminates drill breakage

UTILIZING an entirely new drilling technique . . . "resistance drilling" . . . the Dumore Automatic Drill Head is proving it can virtually eliminate drill breakage when used for small-diameter, deep-hole drilling operations.

With "resistance drilling," the workpiece determines the rate of drill feed and speed. The tool always maintains uniform pressure. No need to rely on operator guesswork. Permits working closer to the maximum strength of the drill.

Based on proven field results under average conditions, this tool has set remarkable production records when operating with these drill diameters: up to 3/32" in steel; up to 1/8" in brass, aluminum, zinc and cast iron; up to 5/32" in plastics and wood.

Get all of the advantages of this amazing shop tool. Specify the Dumore Automatic Drill Head. Ask your nearby industrial distributor for a demonstration, or write to The Dumore Company.



This unusual setup is typical of the many ways that the Dumore Automatic Drill Head can save costs on a production problem. Here, labor costs on bronze nozzle holders were slashed $75 on the first run of 5273 pieces.

DUMORE PRECISION TOOLS

The Dumore Company

1341 Seventeenth Street • Racine, Wisconsin

Should Mentally Ill Workers Be Hired?

Here are answers to questions that are frequently raised. (For a new approach to the mental health program, turn back to page 148.)

1. Should a worker who has a past history of hospitalization for mental illness be hired?

The answer depends on several factors. If the worker was released from the hospital with a "clean bill of health," has since held a paying job successfully, and shows no suspicious symptoms in pre-employment screening, chances are he will do all right.

But some people leave mental hospitals "partially cured," and have relapses. Others can't hold down a job, but are not in serious enough condition to justify further hospitalization. Such people are serious occupational risks.

2. Should a veteran receiving a 30% or 40% disability pension for psychoneurosis be hired?

The federal government has hired a great many of these veterans with good success. But to make an intelligent evaluation it's important to get a complete report from the Veteran's Administration.

Veterans receiving disability pensions are examined periodically. Where they show improvement, the disability is reduced. That in itself is a valuable clue to an employer.

Also, since several years have passed since World War II, it's possible to get a fairly accurate evaluation of the veteran's work experience during the intervening years. A 40% veteran who has had trouble holding down a

MEET MR. LYON, D.D.S.*

*Dealer of Diversified Services

LYON'S national organization of steel equipment dealers serves virtually every segment of business and industry—with a diversified line of products totalling more than 1500 different standard items. (A very few are shown below.)

Factories, shops, warehouses, offices, churches, clubs, hospitals, homes—these are just a few of the many markets Lyon dealers serve with quality steel products.

Engineering and production facilities are also available for special contract work.

FACTORIES IN . . . AURORA, ILL., AND YORK, PA.

LYON METAL PRODUCTS, INCORPORATED

General Offices: 912 Monroe Avenue, Aurora, Illinois

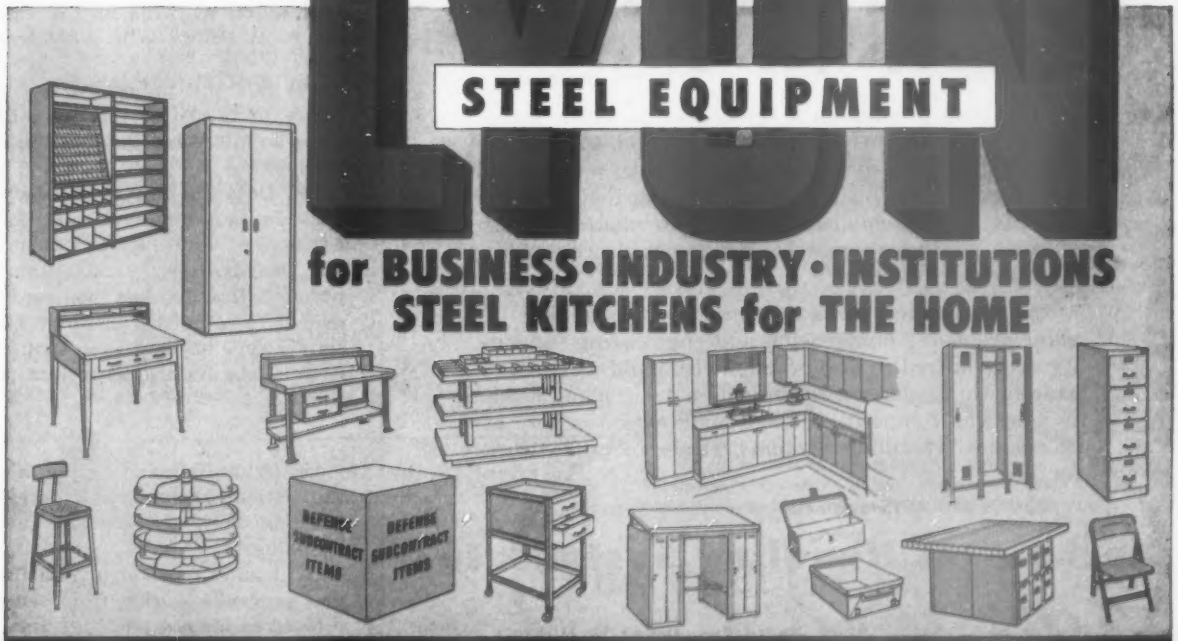
Dealers and Branches in All Principal Cities

LYON®

STEEL EQUIPMENT

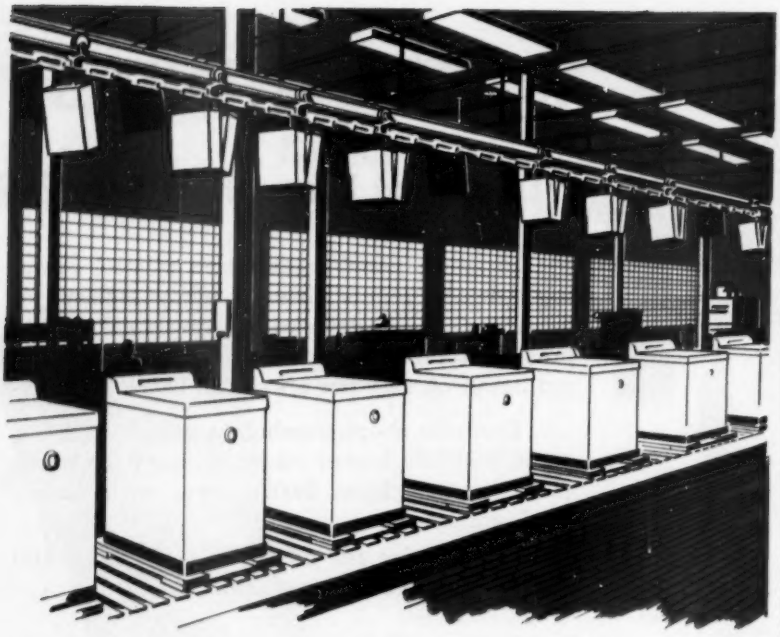
for BUSINESS • INDUSTRY • INSTITUTIONS

STEEL KITCHENS for THE HOME



A PARTIAL LIST OF LYON STANDARD PRODUCTS

• Shelving	• Kitchen Cabinets	• Tool Toters	• Economy Locker Racks	• Display Equipment	• Filing Cabinets	• Service Carts	• Tool Stands
• Lockers	• Cabinet Benches	• Bar Racks	• New Freedom Kitchens	• Flat Drawer Files	• Folding Chairs	• Sorting Files	• Shop Boxes
• Stools	• Storage Cabinets	• Tool Boxes	• Toolroom Equipment	• Revolving Bins	• Work Benches	• Drawer Units	• Tool Trays
• Bin Units	• Drawing Tables	• Parts Cases	• Wood Working Benches	• Hanging Cabinets	• Bench Drawers	• Hopper Bins	• Shop Desks



MECHANICAL MUSCLES *made to order!*

to pace production flow through your plant

Key your production to the flow of materials maintained by an engineered conveyor system. Conveyors, operating at a predetermined speed with mechanical muscles that don't tire nor slow down, deliver components and assemblies according to plan, serve as efficient production controls, lower production costs, raise product quality.

A combination of experience, understanding of plant problems, imagination and engineering ingenuity are required to design, engineer, build and install exactly the right conveyor system your plant needs to keep you competitive. That combination is here at Mechanical Handling Systems, ready to go to work for you.

Call in the MHS engineer

Mechanical Handling Systems Inc.

MHS

4608 Nancy Ave., Detroit 12, Mich.

Offices in Principal Cities

In Canada: Canadian Mechanical Handling Systems Ltd., Toronto

Begins on page 294

job for any considerable period of time represents a poor risk.

3. How do we know when it's advisable to put a rehabilitated worker back on the payroll?

All too often important decisions and adjustments are left up to the patient after discharge from a mental hospital. If the employer is really lucky he may get a statement from the hospital saying the patient should try to avoid "emotional, stress-producing situations." But such generalized statements mean little to the plant doctor, the personnel man, or the individual supervisor or foreman.

To make an intelligent decision, the plant doctor must take the initiative in getting the hospital to answer questions along these lines:

(1) Did the patient's previous employment contribute to his breakdown? If so, how?

(2) Has the patient shown dissatisfaction with his former employment? How? With what features?

(3) Has the patient shown a desire to return to his old job? Or is he interested in other kinds of work?

(4) Does the patient still have attitudes that would make his job adjustment doubtful? For example: Does he have grandiose ambitions? Has he lost his confidence? Does he still insist on his former type of work even though it would be hazardous to him or to others?

(5) What likes and dislikes has the patient shown for different kinds of work and working surroundings?

4. Will some types of mental illness prevent a worker from being rehired in his old job?

The answer is definitely *yes*.

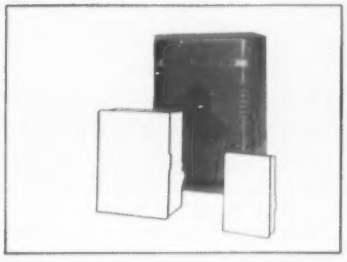
Turn the page

3 Complete Lines

OF TRUMBULL SAFETY SWITCHES

to fit practically any low voltage application with a new high in dollar value

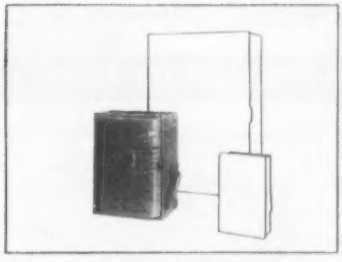
When you select a switch from this complete and superior Trumbull line, you can be sure of getting the best possible device for a clearly defined type of service—and the best combination of favorable first cost and continuing economy of operation.



***HEAVY DUTY INDUSTRIAL**

Exceeds NEMA Type A Standards

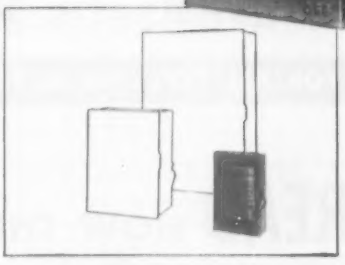
The Trumbull Style HCI Front Operated Safety Switch is without any question the finest switch ever built by Trumbull, the Safety Switch leader. It has every installation convenience, every operating and maintenance advantage, and all the protection we know how to build into a switch. Its unique and thoroughly proved pole units introduce a basically superior switching principle. It is deliberately designed and built to exceed today's requirements and last as near to forever as a switch can.



***STANDARD DUTY**

Meets NEMA Type A Standards

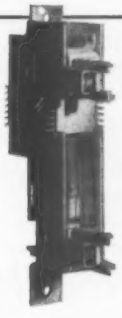
The Trumbull Style HCI Side Operated Safety Switch will meet all but the most rugged demands with *plenty* to spare. It features the HCI pole unit with circuit breaker arc quenching action. While it meets NEMA Type "A" specifications it offers substantial cost savings. No Trumbull safety switch ever offered more for the money.



GENERAL USE

Meets NEMA Type D Standards

The Trumbull Style D Safety Switch is designed for many applications where service is not severe and continued overloads unlikely. This well-engineered and sturdily built switch does its job at real savings in first cost. It is suited for use in many distribution and branch circuits, for flood or sign lighting, service entrances, heating and air conditioning equipment.



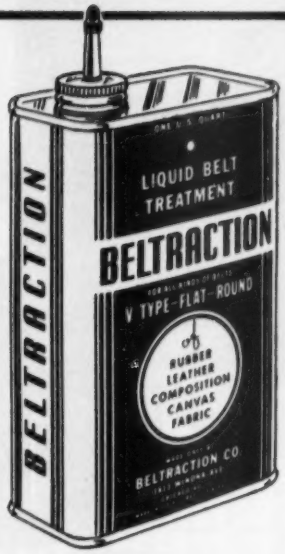
***The pole units** of Style HCI switches feature the magnetic-repulsion principle of arc-quenching, similar to that of a modern circuit breaker. Grid pins break up and quickly dissipate the arc. Double-break visible contacts are actuated by a heavy spring, with practically instantaneous make and break. These exclusive features result in high interrupting capacity and longer switch life.*

There is a Trumbull safety switch to meet practically any application up to 1200 amperes, 600 volts AC or DC. For details see your Trumbull Distributor or write us direct about your requirements.

TRUMBULL (T) ELECTRIC

DEPARTMENT OF GENERAL ELECTRIC COMPANY
PLAINVILLE, CONN.

Preventive MAINTENANCE



BEGINS WITH

BELTRACTION

THE *Liquid* BELT TREATMENT

CERTIFIED BY LEADING INDEPENDENT LABORATORIES AND MORE THAN 110,000 users.

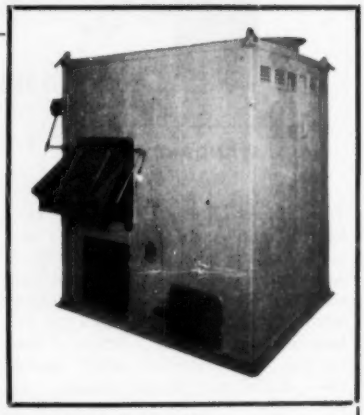
Slipping belts not only slow up production but also cause chattering and misalignment of work, wearing out machines long before their time. BELTRACTION by preventing belt slippage protects against costly delays and breakdowns. Use it regularly — every time you lubricate bearings — and keep equipment operating at top efficiency. Write for the new interesting folder "Horse Power Where and When You need It" which gives results of tests by independent laboratories.

BELTRACTION COMPANY
1823 W. Winona St. Chicago 40, Ill.

FOR ALL TYPES OF BELTS • V-TYPE, FLAT OR ROUND

READ HOW THE BRULÉ TRASH BURNER Does a Top Job

- IN COST CUTTING
- IN SPACE SAVING
- IN CLEANLINESS



You'll get valuable information from Bulletin 52B
(coupon for your convenience)

Here is a compact, patented, portable, and specially engineered unit that will give you every important result in trash disposal. The Brulé FG4-T5 is designed to economically perform in various industrial installations. It has proved its great value in the disposal of general plant refuse including sawdust, paint, sludge, rubber wastes, and hard to burn residues.

Here is true modernization in trash disposal. It pays to investigate.

- 40 years of design experience back of this unit.
- Capacity 500 lbs. per hour, with reduction to 1 lb. of ash.
- Operates on as low as an 18-ft. refractory lined stack.

In Canada: J. H. Lock & Sons, Ltd., 150 Perth Ave., Toronto, Ont.

BRULÉ INCINERATORS
407 S. Dearborn St., Chicago 5, Illinois

Company .....
Your name .....
Address .....
City ..... Zone ..... State .....

MENTALLY ILL WORKERS

Begins on page 294

Each individual case must be studied with this point in mind. For example:

A railroad fireman suffered from hallucinations in which he heard voices urging him to wreck the train on which he was working. Obviously public welfare and safety are endangered in such a case. No matter how good the "cure," it would be senseless to return this man to his former job.

5. Would you tell a foreman a newly hired worker has suffered mental illness?

Usually not. Experience has shown that giving such information to the foreman is apt to be harmful. Too many foremen are inclined to play the role of amateur psychologist.

6. How can nurses in the first aid dispensaries help to spot problem cases?

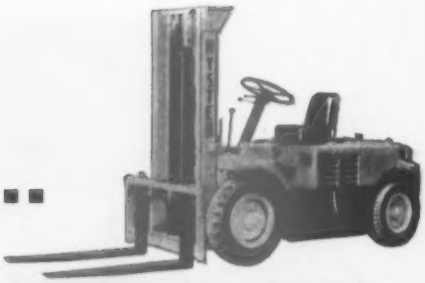
Nurses can do a lot to help spot problems. Theirs is a particularly good vantage point. Some things they can look for:

Excessive visits to first aid by workers with vague complaints. Complaints by workers of "nerves" or "nervous conditions." Evidences of physical troubles (stomach, for instance) that seem to be the result of mental conditions.

7. Should you tell an employee he is being referred to a psychologist or psychiatrist?

Definitely *yes*. The National Association of Mental Health stands solidly behind the idea that there should by no mystery or attempt to camouflage what you are doing. Concealment just makes the treatment harder. The best action is to make every effort to convince the worker that the specialist is there to help him.

To all basic HYSTER TRUCKS...

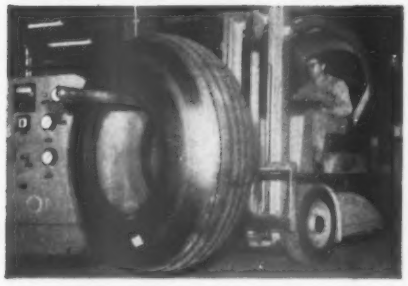


Paper-roll Load-Grab

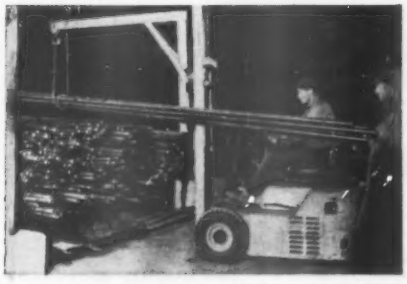
Karry Krane with Boom Extension

4-Barrel Load-Grab

Scoop—for loose aggregates.



Ram—for tires, rolls, spools, etc.



Boom—for odd shapes, light crane work.

you can add... HYSTER attachments

and do scores of jobs quicker...at less cost!

Are your materials hard-to-handle? The right Hyster® Truck Attachment — and Hyster offers more than 100 of them — frequently is the *key* to greater profits.

Whether your product is in the form of bales, boxes, bricks, barrels, buckets, aggregates, rolls or cylinders, your Hyster Lift Truck and the right attachment is the most effective answer to the problem of moving materials which cannot be handled with pallets.

Your Hyster Dealer is a specialist in reducing materials handling costs. He can recommend the correct lift truck practices for *your* materials.

Make the Hyster Lift Truck your *basic* materials handling tool—to it add the right cost-reducing attachments. Call your Hyster Dealer today, or write for Catalogs 1266, 1219, 1258 to:

HYSTER COMPANY

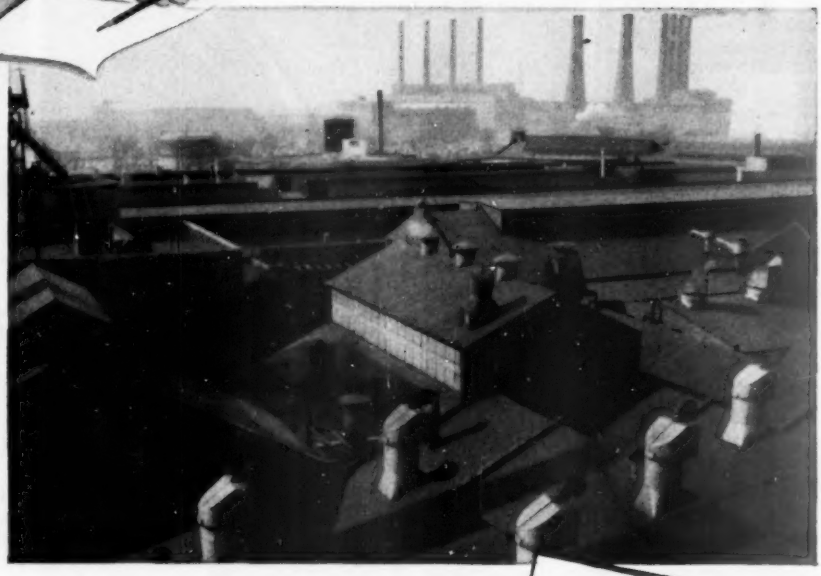
2956 N. E. Clackamas Street.....Portland 8, Oregon
1056 Myers Street.....Danville, Illinois

Be Sure to Call HYSTER Before You Buy ANY Lift Truck!

HYSTER COMPANY • *FOUR FACTORIES:* • *Portland, Oregon; Danville, Illinois; Peoria, Illinois, Nijmegen, The Netherlands*

Would you spend 3¢ to insure longer roof life for your buildings?

FREE Carey Roof Check Survey tells how to correct roof defects ...add years to roof life! It's yours for a 3¢ stamp



Don't wait for roof leaks to warn you of trouble overhead. Most roofs don't leak until felts, flashings, decks, etc. are so badly deteriorated that expensive repairs—even replacement, must be made!

The FREE Carey Roof Check Survey will tell you exactly the condition of flashings, parapet walls, gutters, felts, deck—give you the recommendations of *expert* Carey roofing engineers to guide you in proper maintenance to lengthen roof life. It will be made without cost or obligation to you!

Better grasp this FREE "roof-saving" opportunity right away. It may save major repair and replacement costs later. Fill in and mail the coupon today!

Request Your Free Carey Roof Check Today!

The Philip Carey Mfg. Co.
Lockland, Cincinnati 15, Ohio
Department FMM-9

☐ Please send a copy of your new Built-up Roofing Catalog.

☐ Please have a Carey Roofing Engineer see us about making a FREE Roof Check Survey to tell us the condition of our roofs.

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COMPANY_____
ADDRESS_____
CITY_____ ZONE____ STATE_____

Carey

The Philip Carey Mfg. Company, Lockland, Cincinnati 15, Ohio. In Canada: The Philip Carey Co., Ltd., Montreal 3, P. Q.

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Backed by over 80 years' experience and unrivaled research facilities that have made Carey products and services famous for quality at lowest cost!

Here's the New OSTER *Thrift Model* THREADING MACHINE

RUGGED . . .
LOW PRICED . . .
EASY TO OPERATE

OSTER

For sixty years Oster has been the leading manufacturer of pipe threading machines. The Thrift Model is the newest member of a very complete line. For full facts about it and for sound recommendations on how to solve your pipe threading problems see your local Oster Distributor. Not only does he have the facts, he offers speedy delivery, dependable service...and he stands behind the products he sells. For money-saving facts contact him today.

The new Oster No. 784 Thrift Model is the newest member of the complete line of Oster money-saving threading machines. A machine designed to thread pipe and bolts quickly, efficiently, over a wide range, it is now available at minimum investment.

Features of the new Thrift Model assure threads of highest quality even when the machine is operated under rough conditions. For instance, the front gripping chuck of the new Oster Thrift Model is fast and positive. Operated by handwheel, it requires no wrench and handles pipe size change quickly and easily. The rear centering chuck of the new Thrift Model is universal, wrenchless, quick acting . . . non-binding.

Two quick opening, detachable, lever operated die heads cover the entire pipe range of 1″ to 4″ and bolt range of ¾″ to 3″. Extra range of the Thrift Model is ½″ and ¾″. These die heads are provided with both positive locking device and means for adjusting all dies simultaneously for over or undersize threads.

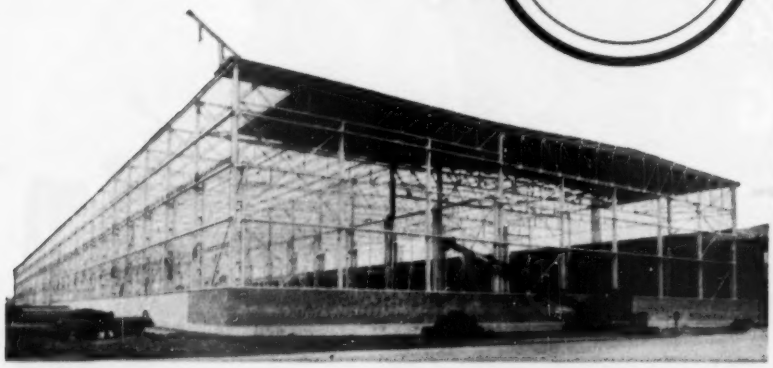
The new Oster Thrift Model is built to handle tough jobs for the man who has a small budget. For a free, fully illustrated, factual booklet about the Thrift Model, write us today.

THE OSTER MANUFACTURING CO.
Main Office and Factory:
2039 East 61st St., Cleveland 3, Ohio

1893 • CELEBRATING 60 Years Leadership in the Threading Industry • 1953

CONSTRUCTION SCHEDULE:

RUSH



Getting steel on the job to get this framework up on schedule took a lot of doing. Meeting a 60-day delivery deadline would be tough enough any time. Meeting it at a time of critical steel shortage posed a king-sized problem. But teamwork resulted in a job-speeding solution... and with no premium on construction costs.

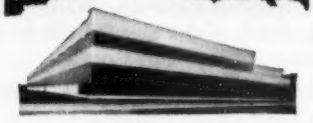
International engineers worked with the general contractors, shared their experience to expedite completion—helped to design the building around available steel. International's large stocks yielded the 1,000-odd tons of steel required to start this project rolling. This joint effort met the tight construction schedule. In fact, within eight weeks after date of the order the first structural shapes were on the way!

Steel framing for new plant of Shaw-Box Crane & Hoist Division of MANNING, MAXWELL & MOORE, INC., Muskegon, Michigan

CUNNINGHAM-LIMP, Detroit, Michigan: Contractors

JOHN F. BEASLEY CO., Chicago, Illinois: Erectors

INTERNATIONAL STEEL CO.: All Structural Steel



Only a completely coordinated organization could have satisfied the stringent requirements of the job described above. This same all-inclusive — and always interested — service is ready to work with you on any problem involving steel fabrication. Write today and tell us about your needs.

INTERNATIONAL SERVICE

1952 EDGAR ST. • EVANSVILLE, IND.

INTERNATIONAL STEEL COMPANY

NEW MATERIALS

SOLDERING FLUX developed especially for use on stainless steel, monel, inconel, nichrome, chromium, manganese, molybdenum, tungsten, and vanadium alloys has been introduced by the Remont Manufacturing Co., 1310 Meyers Rd., Lombard, Ill. Will remove persistent oxides that usually cause trouble in the soldering of stainless steel without affecting the corrosion resistant properties. Also helps solder to flow at the lowest possible temperatures, the maker says.

THE CLEANING OF GREASY, OILY, AND DIRTY MACHINE PARTS can be done with the Safty Solvents of the Harco Chemical Co., Cranford, N. J. Developed to replace carbon tetrachloride, they dry fast and leave no deposit. Flash points range from 140 to 280 F.

MEDIUM-HIGH ALKALINE METAL CLEANER, specially formulated for the vitreous enameling industry, has been developed by the Detrex Corp., Detroit, Mich. Called Detrex 63, it is said to have high penetrating properties.

VERSATILE FOAM RUBBER PADDING called Brafoam has been marketed by the Rubber Fabrics Co., 261 Fourth Ave., New York. It can be used for absorbing shock, nonskid gripping, and protective clothing. Brafoam is permanently bonded to cloth and is washable. Comes in thicknesses from 1/16 to 3/8 inch.

INCOMBUSTIBLE, INORGANIC INDUSTRIAL PAPERS used for the filtration of hot, corrosive air, gases, and liquids have been announced by the Owens-Corning Fiberglas Corp, Toledo 1, Ohio. These papers are made of extremely fine glass fibers. They have high temperature resistance and good electrical-chemical properties.

Turn the page

SQUARE D *Reduced Voltage* STARTERS

One of these 4 types will meet your requirements . . . best

- Is minimum motor current inrush your primary consideration?
- Is it reduced starting torque? Or maximum smoothness in acceleration?
- Is cost an important factor?

With these four types Square D can meet any reduced voltage starter requirement—exactly.

Write **for Reduced Voltage Starter Bulletins. They give complete details.**
Address Square D Company, 4041 N. Richards Street, Milwaukee 12, Wisconsin.

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

1903 • 50 YEARS OF DESIGN LEADERSHIP • 1953

Why SKLEEN?
Over 10,000 different brands of cleaners are manufactured today. All 10,000 will clean floors —but with varying degrees of cleanliness. A full year of investigation revealed the shortcomings of most of these cleaners...showed a definite need for a floor cleaner that would:
1 THOROUGHLY CLEAN
2 BE GENTLE & NON-INJURIOUS TO ALL SURFACES
3 RINSE FREELY, LEAVING NO FILM OR SCUM
4 BE ECONOMICAL
The Result Was SKLEEN
LIQUID DETERGENT FLOOR CLEANER
The synthetic cleaner that is scientifically formulated to clean floors fast, thoroughly, gently . . . and economically.

Vestal

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4963 MANCHESTER AVE.
ST. LOUIS 10, MO.

VESTAL, INC., 4963 Manchester, St. Louis 10, Mo. Dept. F

☐ Have your Vestal representative demonstrate SKLEEN for me.

☐ Send a free copy of report containing results of scientific tests on SKLEEN'S performance.

NAME _____

ADDRESS _____

CITY _____ STATE _____

NEW MATERIALS

Begins on page 302

FLAMEPROOF COMPOUND Permaproof 300, will provide cotton cloth with a durable finish impervious to combustion even at temperatures up to 4500 F. It was developed by the Treesdale Laboratories and Textile Processing Co., Pittsburgh. Clothing treated with this compound has been factory-tested in the steel industry for several years.

COPPER PURIFIER eliminates the need for periodic dumping of copper plating baths by removing harmful impurities and converting them to useful cyanides. Produced by Sel-Rex Precious Metals, Inc., 229 Main St., Belleville, N. J. It isolates carbonates, chromates, and sulphates as a heavy, dense precipitate that can be filtered out of solution.

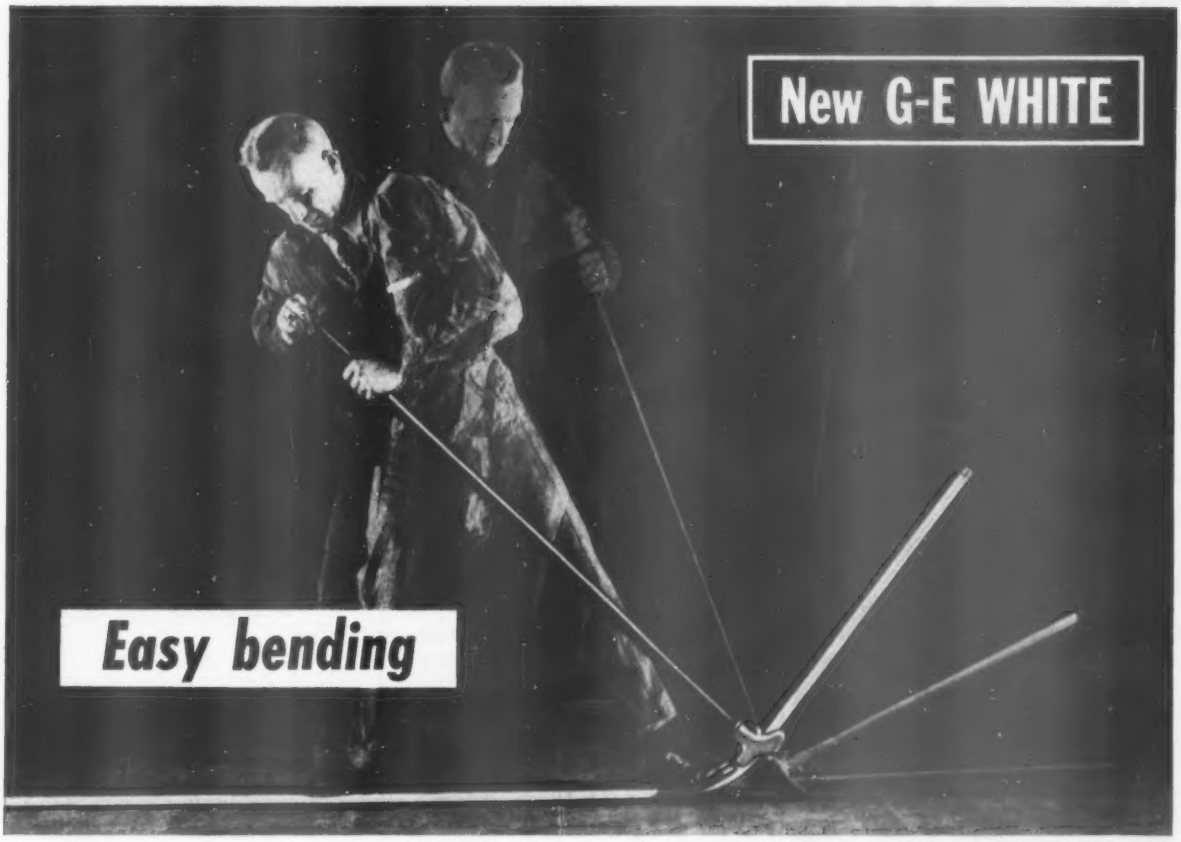
NUBELON-S is a modified silicone-base baking enamel for metal. It was developed by The Glidden Co., Cleveland. The company claims this finish overcomes the natural tendency of organic finishes to lose flexibility when surface hardness and resistance to abrasion is increased.

VAPCO PREVENTATIVE, SLIME-X, AND CLEANER are three water conditioning products aimed at helping to maintain the efficiency of water-cooling equipment in air-conditioning systems. They are being marketed by the Garman Co., Inc., St. Louis, Mo.

THE PROPERTIES OF PLASTICS AND MAN-MADE RUBBER are combined in a rubber film that can be electronically sealed to itself. The electronically-welded seams become even stronger than the material, and no taping or cementing is required, says the manufacturer, B. F. Goodrich, Akron.

Turn the page

G.E. Announces New Rigid Conduit



A new G-E WHITE rigid steel conduit that has easy bending, easy wire-pulling, and improved corrosion-resistance characteristics has been introduced by General Electric's Construction Materials Division.

These improvements have been made possible by a zinc-coating process called "metallizing", which has been proved by more than 30 years of service in other applications. Metallizing bonds a controlled, uniform coating of pure zinc to the conduit, threads and all, to provide lasting protection against corrosion. The conduit is then given the added protection of a coating of C-553 lacquer over the metallized zinc.

New G-E WHITE rigid conduit conforms with the American Standards Association specifications, is listed by Underwriters' Laboratories, Inc., and meets all U. S. Government specifications. Ask your distributor about it. Section C-25-934, Construction Materials Division, General Electric Company, Bridgeport 2, Conn.

New G-E WHITE is easier to bend because the "metallizing" process flame-coats the zinc to the conduit—eliminating the quenching and straightening that cause hardening.

Wire-pulling is easier because new G-E WHITE is lined with a new corrosion-resistant coating, containing an anti-friction agent.

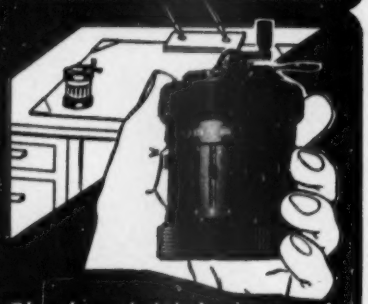
You can put your confidence in—

GENERAL ELECTRIC

1878 75 1953 YEARS OF ELECTRICAL PROGRESS

CURTA
Calculating Machines

Lowest Priced, Complete Calculators on the MARKET!



The low initial cost and trouble-free service of your CURTA Calculating Machine saves you money.

Field Work — distance and weight figures

Sales Engineering—shipping and discount ratios

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Inventory — totals wherever you go

Assign it any of the normal computing problems which occur during every business day. It performs admirably as a desk type machine giving rapid results. CURTA Calculating Machines can be transported with ease to hundreds of vantage points in your business, and are very simple to operate. Because of their low price your appropriation for calculating equipment spreads over a larger number of these versatile machines, giving more individuals in the organization *a personal calculating machine.*

FULLY GUARANTEED
for complete descriptive Literature,
-or 10 DAY FREE TRIAL

Write Dept. FM-9

CURTA Calculator Co.
3851 W. Madison Street
Chicago 24, Illinois

NEW MATERIALS

Begins on page 302

CLEAR BAKING ORGANIC VARNISH combines high bonding strength with flexibility and long life at Class B temperatures and above. Made by the General Electric Co., Pittsfield, Mass. Designed for aircraft generators and transformers, motor generators, and other heavy equipment with insulation requirements above Class A.

CARTON PRECOATING MATERIAL seals and smooths the surface of rough and gray chip board to produce at low cost a superior printing surface. According to the producer, National Adhesives, 270 Madison Ave., New York 16, the coating operation can be integrated with the printing operation on a web feed.

ACTANE 33 will in many cases replace hydrofluoric acid. Because this product is powdered, it is less hazardous to handle than liquid hydrofluoric acid. Produced by Enthone, Inc., 442 Elm St., New Haven, Conn. Can be mixed with nitric and sulfuric acids to cleaning and pickling jobs.

SANDING SEALER for use as a first coat on most common woods has been announced by the Minnesota Platon Corp., Pipestone, Minn. The Platon sanding sealer also acts as a filler so that after the wood is resanded lightly it has a uniformly dense surface.

CLASS H SILICONE INSULATION VARNISHES to make electrical equipment work harder and last longer are being made by Linde Air Products Co., 30 E. 42nd St., New York 17. These varnishes are designed to fill the need for a Class H insulation for applications ranging from flexible glass cloth or tape to rigid transformer insulation.

Turn the page

TESTING or QUALITY CONTROL PROBLEMS?

Look to **Sperry**

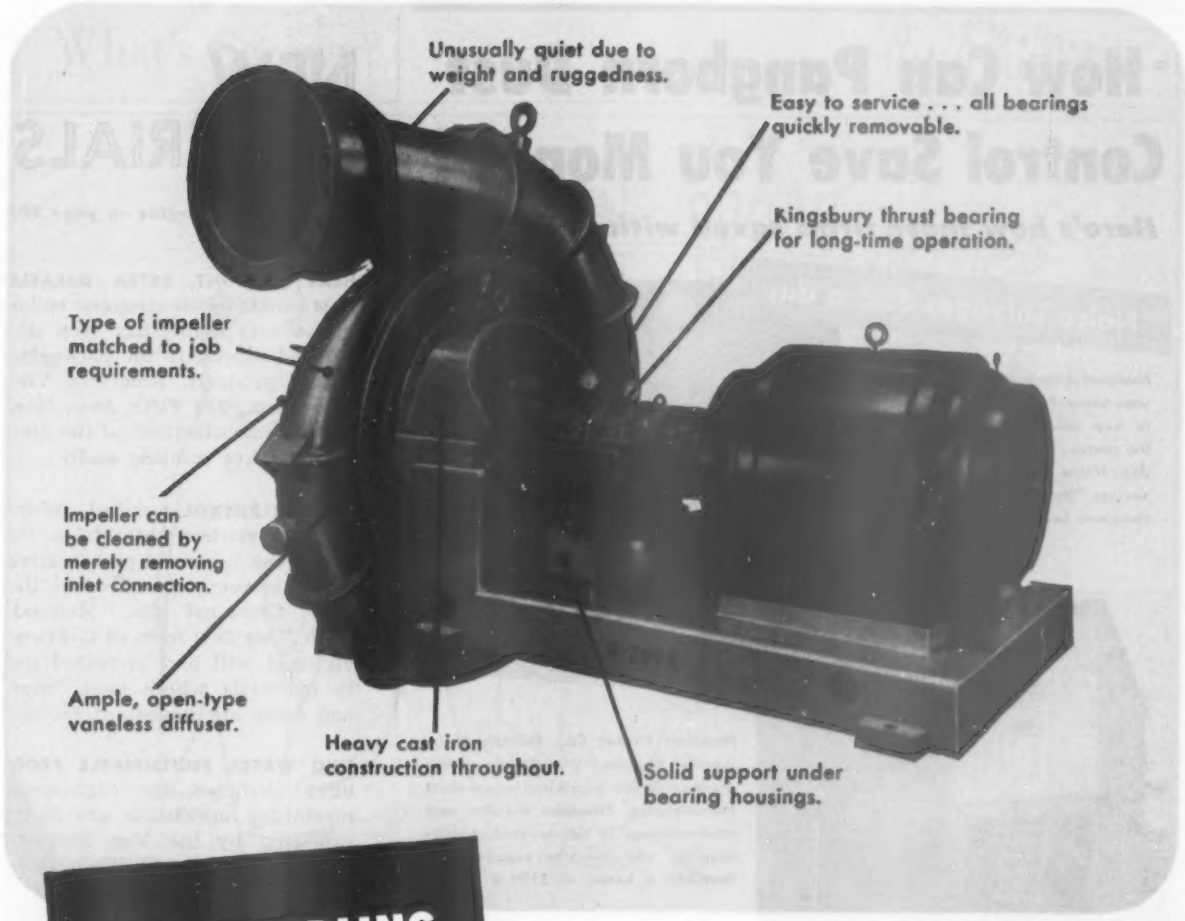
Ultrasonic
RESEARCH and DEVELOPMENT
FOR SPECIAL METHODS TO SUIT YOUR MATERIALS OR PRODUCTS

A pioneer in the development of Ultrasonic REFLECTOSCOPE and other non-destructive testing methods for modern industry, SPERRY is exceptionally well qualified to help solve your difficult inspection, testing or quality control problems. Our thorough knowledge, wide experience and complete laboratory facilities are available to help you improve product quality and dependability, lower inspection costs or reduce time wasted processing or machining defective raw materials.

For further information, write to us outlining your problem. If you wish, a Sperry Engineer can visit your plant to make a preliminary or a complete survey as required.

SPERRY PRODUCTS, INC.
1609 Shelter Rock Road
Danbury, Connecticut

Ultrasonic **Sperry** *Inspection*


Unusually quiet due to weight and ruggedness.
Easy to service . . . all bearings quickly removable.
Kingsbury thrust bearing for long-time operation.
Type of impeller matched to job requirements.
Impeller can be cleaned by merely removing inlet connection.
Ample, open-type vaneless diffuser.
Heavy cast iron construction throughout.
Solid support under bearing housings.

AIR HANDLING *Specialists* OFFER EXTRA BLOWER VALUES

These practical advantages indicate the high qualities of R-C Single-Stage Centrifugal Blowers. They enable these units to rate high in reliable performance, low operating cost, reduced maintenance and long-time satisfaction. Especially, where production depends on steady, continuous supplies of gas or air, trouble-free operation and minimum down time are imperative.

The outstanding records of R-C equipment, in these important qualities, are the results of almost a century of building air- and gas-handling equipment, exclusively. Further, only Roots-Connersville offers the *dual-ability* line of blowers, exhausters and gas pumps in both centrifugal (single and multi-stage) and rotary positive designs. This *dual choice* permits unbiased recommendations by R-C engineers, so that type, size and other characteristics can be matched to specific requirements.

For your present or future needs, in blowers, exhausters, gas or vacuum pumps, meters and inert gas generators, you will get sound counsel and competent co-operation from this organization of specialists in moving gas or air.

ROOTS-CONNERSVILLE

Exclusive Specialists in Handling Gas and Air

ROOTS-CONNERSVILLE BLOWER A DIVISION OF DRESSER INDUSTRIES, INC.
539 Central Ave. · Connersville, Ind.

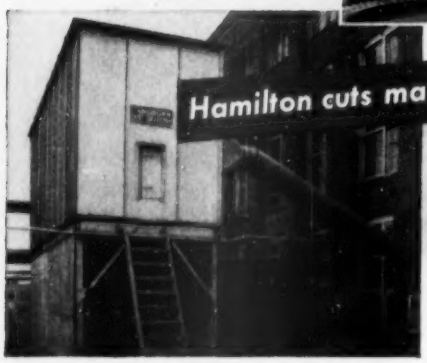
How Can Pangborn Dust Control Save You Money?

Here's how these firms saved with Pangborn:

Nalco salvages $50 a day

National Aluminate Co., Chicago, Ill., **uses seven Pangborn Dust Collectors to trap valuable chemical dusts at the source . . . saves well over $50 a day. Nalco reports that reclamation savings "have already paid for the Pangborn Collectors."**

Hamilton cuts maintenance $100 a month



Hamilton Rubber Co., Trenton, N. J., **installed Pangborn Dust Control to improve employee morale and reduce plant housekeeping. Pangborn did this and more—savings in maintenance, housekeeping, and machine repairs give Hamilton a bonus of $100 a month!**

THE case histories above tell our story. Whether you want to increase profits by reclaiming valuable dust or cutting maintenance costs . . . whether you're interested in improving working conditions or community relations . . . whether your needs are big or small, Pangborn will solve your dust problem. For information on how Pangborn can save you money, mail the coupon below now!

Look to Pangborn for the latest developments in Dust Control and Blast Cleaning equipment

Pangborn DUST CONTROL

STOPS THE DUST HOG from stealing profits

MAIL THIS COUPON TODAY for more information on Pangborn Dust Control.

PANGBORN CORPORATION,
2100 Pangborn Blvd., Hagerstown, Md.

Gentlemen:
Please send me Bulletin 909A without obligation.

Name.....

Firm.....

Address.....

City..... Zone..... State.....

NEW MATERIALS

Begins on page 302

HEAVY - WEIGHT, EXTRA - DURABLE FILM said to be the strongest cellophane ever made, has been developed especially for packaging textile products. American Viscose Corp., 350 Fifth Ave., New York 1, manufacturer of the film, says it takes printing easily.

O-PHENYLPHENOL, purified, colorless and odorless white flakes, for use in the industrial preservative field, has been announced by the Dow Chemical Co., Midland, Mich. This new form of O-Phenylphenol will find increased use in materials where taste, odor, and color are important factors.

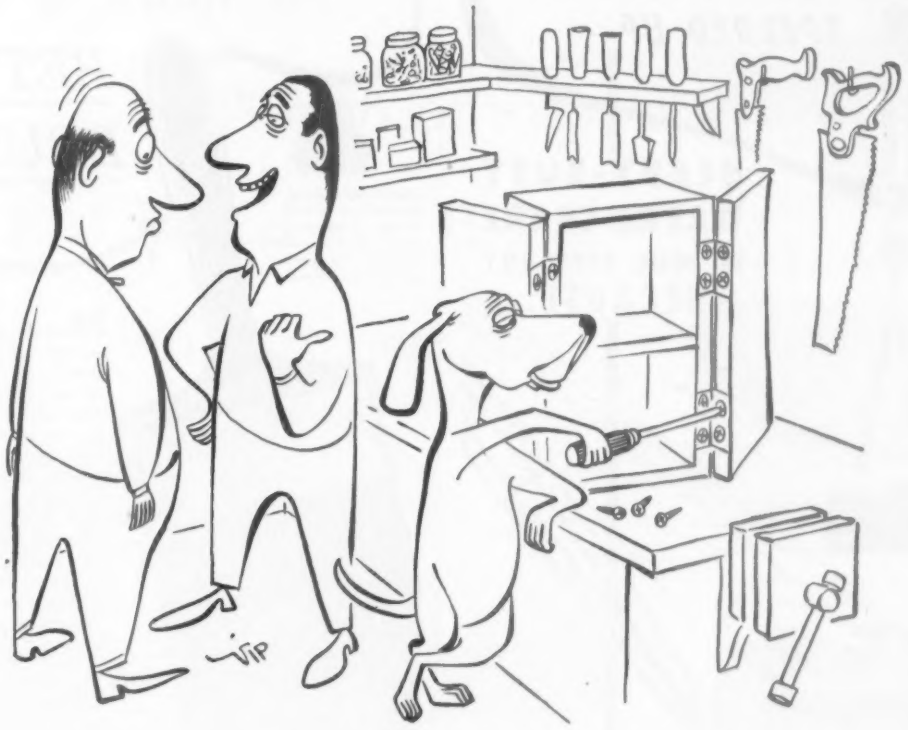
TWO WATER EMULSIFIABLE PRODUCTS designed for high-speed machining operations are being produced by the Van Straaten Chemical Co., 546 W. Washington Blvd., Chicago. These water solubles are said to have superior wetting, high penetration, and exceptionally good lubrication characteristics. They are known as Vantrol 5491A and 554-H.

VINYL RESIN FOR DRY BLEND FEED of extruded products such as wire jacketing, tubing, welting, hose, and similar products has been developed by the U. S. Rubber Co., Rockefeller Center, New York 20. Called Marvinol VR-22, it is a straight polyvinyl chloride resin of high molecular weight that absorbs plasticizer in heated mixers and gives a dry, free-flowing, uniform mix.

TEXTURED FINISH RE-NU-IT when air-blasted on a surface will protect and beautify the appearance of wood, clapboard, masonry, and shingles. Contains asbestos and mica, and carries a 10-year replacement guarantee. Made by Re-Nu-It Corp., 424 W. 42nd St., New York.

What's Screwy?

by Phillips



"Oh, he's not so smart. It's just that those Phillips Screws are so easy to drive."

PERFECTLY MATED! Only Phillips Drivers are perfectly mated to Phillips Screws. Look for the name Phillips on the shank.

EASE of driving is only *one* big advantage. Phillips Screws save time, work and money. They also add structural strength, set up tighter, resist the loosening effect of vibration. And they eliminate driver skids, damaged parts and split screw heads.

The identifying X on the cross-recessed-head identifies the x-tra quality of Phillips Screws instantly. Be sure to state "Phillips" on the specifications.

PHILLIPS *Cross-Recessed-Head* SCREWS

X *marks the spot... the mark of extra quality*

AMERICAN SCREW COMPANY • ATLANTIC SCREW WORKS, INC. • THE BLAKE & JOHNSON CO.
CENTRAL SCREW COMPANY • CONTINENTAL SCREW COMPANY • THE EAGLE LOCK COMPANY
ELCO TOOL AND SCREW CORPORATION • GREAT LAKES SCREW CORPORATION • THE H. M. HARPER CO.
THE LAMSON & SESSIONS COMPANY • NATIONAL LOCK COMPANY
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PHEOLL MANUFACTURING CO. • ROCKFORD SCREW PRODUCTS CO. • SCOVILL MANUFACTURING CO.
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STERLING BOLT COMPANY • STRONGHOLD SCREW PRODUCTS, INC. • WALES-BEECH CORP.

TODAY'S AND THE FUTURE'S... FINEST FASTENER

IF YOU WANT YOUR
YARD OPERATIONS
SPEEDED UP—

HEAVY-DUTY
WAYNE CRANE
IS YOUR BEST BUY
BECAUSE...

10-Ton
Model 20
Wheel-Mounted

- IT TRAVELS
- IT SWINGS
- IT HOISTS
- IT BOOMS

either SIMULTANEOUSLY
or INDEPENDENTLY!

This means no stopping, clutching and shifting at each operation—saves time and excessive wear—results are more production, less costly downtime.

Wayne Crane Model 20 has three equal speeds forward and reverse—no turn-around problem.

A Wayne Crane dealer is located in every major industrial city. See him or write TODAY for specifications and prices. You'll like both!

WAYNE CRANE
Heavy-Duty
INDUSTRIAL CRANES
8 to 12½-ton capacity

ALSO AVAILABLE
MODEL 40 12½-Ton Truck-Mounted
MODEL 66 8-Ton Crawler-Mounted

WAYNE CRANE DIVISION
AMERICAN STEEL DREDGE CO. INC.
FORT WAYNE 1, INDIANA

Why is this
the mark of a
BETTER
BRUSH?

CROSS-SECTION of Pittsburgh-developed feather-tip Neoceta bristle—showing molded in grooves for superior paint carrying capacity

MISTER, the RED STRIPE on your brush is your assurance of quality! It means that the feel of the handle, the flex of the bristles make *any* painting job easier for you. It means that whether you choose Red Stripe's all-Neoceta brush or Red Stripe's combination of hogs' bristle and Neoceta, you're getting a brush that paints smoother, faster, better. Why? Because Neoceta, Pittsburgh's feather-tip wonder-bristle, is designed *especially* for painting. And, in hogs' bristle - Neoceta combinations, both bristles wear at the same rate—another reason for better performance and longer life. Next time you need a brush, ask your supplier to show you Red Stripe!

FREE—the story of Neoceta—its development, its amazing characteristics. Write to the address shown below for your free copy of this interesting booklet.

There's a Pittsburgh brush for every home and industrial use!

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BRUSHES • PAINTS • GLASS • CHEMICALS • PLASTICS • FIBER GLASS
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- Six widths.
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Stronger Wrap for Big Packs

Angier's new Glass-wrap is reinforced with strong glass fibres to give *better* protection at less cost. Waterproofed; flexible; up to 96" wide. *Check below for FREE sample & facts.*

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Saves greasing. Saves degreasing. It's Angier's *proven* vapor rust preventive —VPI® Wrap. Easiest, *sure* way to store or ship your metal products. *Check below for FREE sample & facts.*

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It's the *fast* way to seal cartons. Yet, that *one* strip along the center seam gives you a *stronger* closure! That's because Snake Tape is reinforced to give strap-like strength.

Center-seam sealing is accepted for parcel post, railway express, air express, and truck shipments; it also is accepted for carload and LCL rail shipments where rule 5, section 1 (c) of Uniform Classification applies. *Check below for FREE sample & facts.*

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Framingham 1, Massachusetts

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- ☐ Angier's glass fibre-reinforced Glass-wrap.
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Industrial Pneumatic Cleaning Systems

Permanently piped, stationary systems that pick up where present collectors leave off! On process operations or plant cleaning, Hoffman-designed systems provide big capacity for central collection of dust from several areas at same time. Sizes from 3 to 100 H.P., or larger to your requirements. Engineering survey, without obligation. Write for technical Bulletin A-939.

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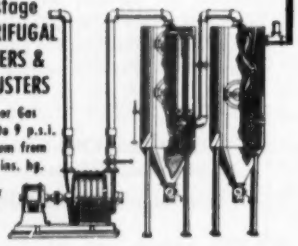

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CANADIAN PLANT: NEWMARKET, ONT.

Ten rule-of-thumb elements that will help you decide . . .

Which Community to Build in

By RONALD B. PETERSON
Director, Bureau of Business Promotion
New York State Department of Commerce

Where will you build your new plant? Which community in a given region is best for you? Here are 10 basic elements that have to be considered in your appraisal of an individual community.

1. PHYSICAL FEATURES

Is the community area adequate for expansion or inclusion of new industry?

Are there any topographic or other natural barriers to expansion?

Do climatic conditions preclude year-round activity of certain industrial operations?

Does relative geographic location give the community any worthwhile selling points?

2. PEOPLE

Has population declined, increased, stood still? Why?

Do per capita telephones, bank deposits, incomes, and percentage of home owners indicate a comparatively prosperous local economy?

Do total employables represent a reservoir of labor over those already employed?

Are young people of the community taking jobs elsewhere? Would better job opportunities alone keep them at home?

Does a good share of labor presently commute from other communities? Could this working force be expanded?

Is the working force predominantly of one sex? Does this mean that workers of opposite sex are not available?

Is the percentage of skilled labor low? Does this indicate lack of skill or actually lack of opportunity?

Are skills practically limited to one or two fields? Does this represent a need for diversification?

Are normal service skills adequately represented? Plumbers? Carpenters? Electricians?

Is unionization general? Confined principally to one large group?

What is the community's labor-management relations record? If improvement is needed, is the method obvious and reasonable?

Are wages for the area above or below average? Are they too high for consideration by most new industries: If they are low, would a new industry disrupt the entire economic pattern?

Is there a seasonal pattern of employment resulting in lower annual wages than the prevailing wage rates should furnish?

Turn the page

When Butane says "HANDLE WITH CARE"

CHIKSAN ADDS SAFETY and SPEED TO LOADING OF TANK CAR AND TRUCK

With counterbalanced Chiksan loading racks, one man can quickly and easily make connections to tank cars.

CHIKSAN low pressure swivel joints employed here on both supply and return lines insure safety, speed and economy in loading tank cars.

It takes speed, safety and kid-glove handling to keep up the massive flow of liquefied petroleum gas at Standard Oil Company of California's El Segundo plant.

Chiksan provides the necessary liquid-tight, gas-tight unions, the characteristic flexibility of motion to keep the touchy Butane flowing at a swift, even pace with safety to workers, plant and community — with profit to the company.

No less than eight Chiksan Ball-Bearing Swivel Joints are needed for each loading installation to keep the gas moving into tank and truck—to provide the essential carry-off of the highly explosive vapors. And with Chiksan on the job, metal of relative low porosity takes the place of more porous and less safe rubber.

Standard Oil Company of California's El Segundo installations are typical of industry's reliance on Chiksan Ball-Bearing Swivel Joints around the world to speed the flow of enterprise — to promote production and defense—to increase safety—to protect profits.

Wherever liquid or gas must flow in industry — wherever hydraulic systems can add efficiency and economy—Chiksan Ball-Bearing Swivel Joints are on the job. If more flexibility—greater stamina—longer life and added economy are of interest to you, Chiksan's Research and Development Division can help you find a better, swifter way.

A typical near ground level truck loading rack using CHIKSAN joints on supply and return lines.

Close up of CHIKSAN low pressure joints on supply and return lines in truck loading of Butane.

The Flow of Enterprise Relies on **CHIKSAN** *Ball-Bearing Swivel Joints*

Representatives in Principal Cities Write for Catalog 53-C, Dept. FMM-9

CHIKSAN COMPANY • BREA, CALIFORNIA • Chicago 28, Illinois • Newark 2, New Jersey

Weil Equipment Mfg. Corp. (Division), Houston 1, Texas • Chiksan Export Company (Subsidiary), Brea, California; Newark 2, N. J.

WHICH COMMUNITY TO BUILD IN

Begins on page 312

Are such seasonal workers actually employable when not working?

Does the community have an established industry depending on some seasonal workers in order to give full employment to others?

Is manufacturing employment concentrated in one or two companies?

3. NATURAL RESOURCES

What are the natural resources of the area (mineral, forest, water, etc.) which might be utilized by your industry?

Where are they? In what quantity?

Who owns mineral and forest resources? Can they be purchased?

Has local capital developed any of these resources in the past? If not, is there some sound economic reason?

Is ground water accessible in the area? Is it constantly suitable in quantity and character for processing needs, air conditioning, human requirements?

Do surface streams have those qualities which fit them for use as sources of processing water, power, waste disposal, etc.?

4. UTILITIES

Is the water supply system adequate for present needs?

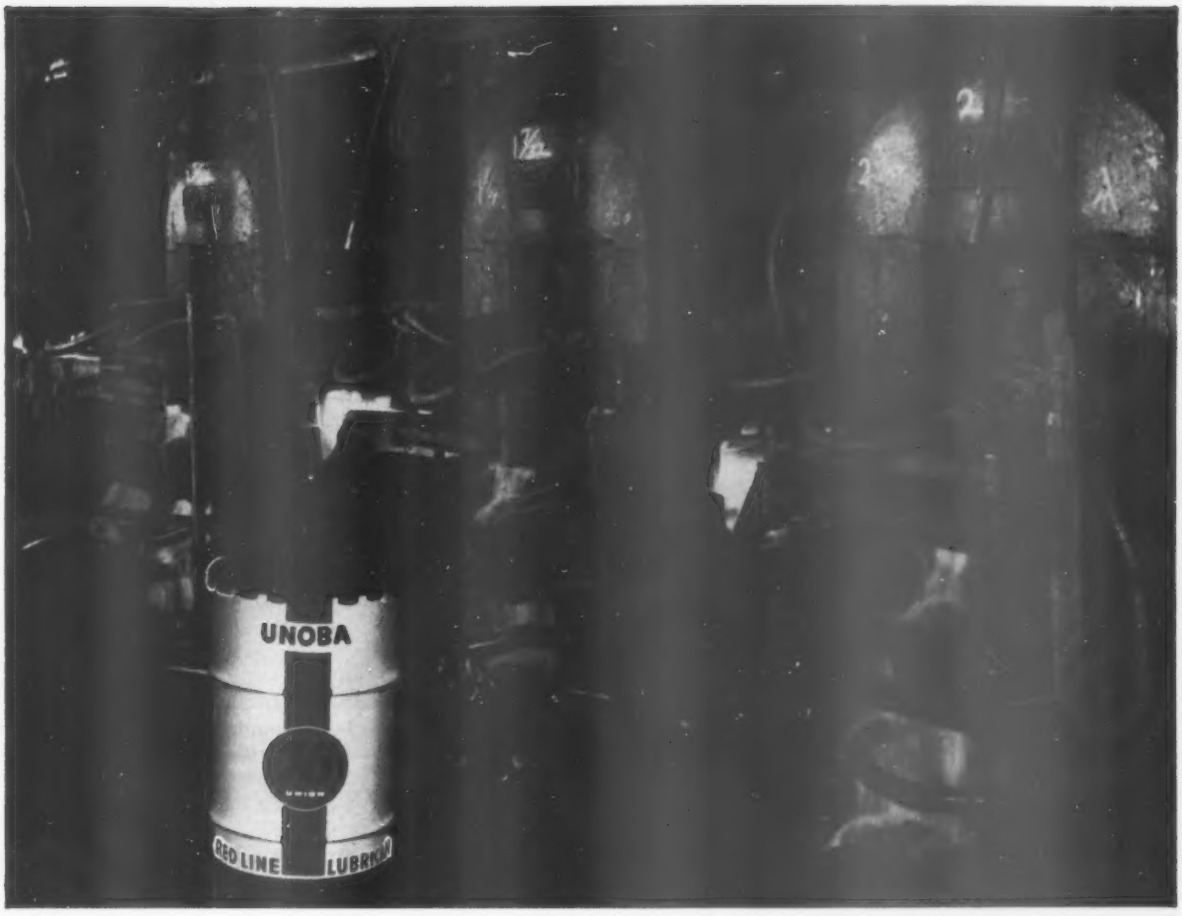
Would it be adequate to care for a substantially increased demand?

If not, could it be sufficiently expanded or would you have to install an entire new system?

Is the available water especially hard or soft? To such an extent as to affect its use industrially? Are quality and quantity constant the year around?

If the community has a sewage treatment system, can this handle an increased load? Is it so planned that the addition of industrial wastes would hamper or break down the treatment process?

Turn the page



Men can't take the heat—but UNOBA can!

No one goes near these continuous rolling mills when they're in use. Even from a safe distance you can feel the blast of heat as a white-hot steel snake flashes through. You can see and hear the cooling water hiss into steam as it hits the rollers. This is the kind of rugged job UNOBA grease was designed to handle.

UNOBA withstands the extreme heat radiating from the glowing steel. UNOBA sticks to the rollers in spite of the rush of cold water used to cool them. And UNOBA hangs on with a grip that sudden shocks and terrific pressures can't break.

UNOBA cuts replacement costs by giving your equipment complete protection. UNOBA reduces wear, makes machines and equipment last longer.

UNOBA solves inventory problems. This *one* grease does the job of as many as *seven* greases.

See for yourself how UNOBA can solve *your* lubrication problems . . . and save you time and dollars.

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CINCINNATI: 2111 Carew Tower Building • NEW ORLEANS: 644 National Bank of Commerce Building

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Makers of T5X, the amazing purple heavy-duty motor oil.

and another sagging market gets a boost from . . . General Packaging Laboratories

Quincy Stove Company, Quincy, Illinois, faced an actual drop in sales when their Monogram Oil Heaters started arriving at dealers' in a damaged condition. They presented their problem to General Box Company Engineers. Results:

- A Watkins-Type container, specifically designed to withstand heavy punishment and meet Pre-Tested Safe Transit Standards, was developed.
- The product itself was tested on General Box Company's exacting laboratory equipment; improved design corrected cause of failure.

In the three years since the changes were made, Quincy Stove Company's damage in shipment claims have totaled less than $200.00. This is only one among many packaging problems solved every day—at a saving—in General Box Company's two fine Industrial Packaging Laboratories.* Let us help *you* cut packing and shipping costs. Write today for full information.

Find out how other manufacturers are cutting packaging costs. Write for your free copy of "The General Box."

*General Box Company Laboratory facilities are certified to make "National Safe Transit" tests

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WHICH COMMUNITY TO BUILD IN

Begins on page 312

Is there any feasible way to handle industrial wastes in large quantities?

Are delivered costs of coal, oil, and other fuels substantially higher than in other near-by areas? Are there established supply lines for these materials that terminate locally?

How does the industrial electricity rate in the community compare with other areas?

Can the servicing power company meet substantial additional power demands?

5. TRANSPORTATION

Is the local public transportation system adequate for community needs?

Are fares in line with service rendered?

Is the community serviced by rail, water, highway, and air transportation lines?

Can they handle additional traffic?

Are the rates reasonable, or low enough to constitute a selling point?

For low-value bulk materials? For rapid transit of finished goods?

Can goods be shipped two or three hundred miles without expensive transhipment?

Does the community have adequate local terminal facilities for existing forms of transportation? Dockage, sidings, freight yards, airport, warehouses, loading and unloading equipment, etc.?

6. MARKETS

Is there a good market within a 25- to 50-mile radius of the community for consumer goods and services? Are many of these imported now from other regions? Why?

Are there concentrations of industry within an overnight haul (200-300 miles) which offer a potential market for producer or capital goods produced in the community?

Turn the page

CORRUGATED *Asbestos* TRANSITE*

Defies corrosive fumes

The outside structural steel framing of this coke quencher station is being effectively protected against the severe and destructive steam and acid fumes by Johns-Manville Corrugated Transite.

Defies corrosive moisture

J-M Corrugated Transite resists the deteriorating effect of severe seacoast wind and salt spray conditions—gives long, maintenance-free service in moisture-laden lake and river front areas.

You build economically and quickly with these versatile fireproof and weatherproof asbestos building sheets

In the past quarter century, Johns-Manville Corrugated Transite has proved an ideal material for roofs and for sidewalls of industrial, commercial, institutional and agricultural buildings. Made of asbestos and cement, the large sheets are easy to handle, go up quickly with a minimum of framing. Practically indestructible, Corrugated Transite is fireproof, rotproof, weatherproof; needs no paint or special treatment to preserve it, and can be salvaged and re-used if necessary.

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Investigate J-M Corrugated Asbestos Transite and learn how you can build quickly and easily . . . have an attractive, long-lasting, trouble-free structure regardless of size or purpose. For complete details write Johns-Manville, Box 158, Dept. PE, New York 16, N. Y. In Canada write 199 Bay Street, Toronto, Ontario.

*Reg. U. S. Pat. Off.

EASY TO FASTEN TO STEEL

EASY TO SAW

EASY TO DRILL

EASY TO NAIL TO WOOD

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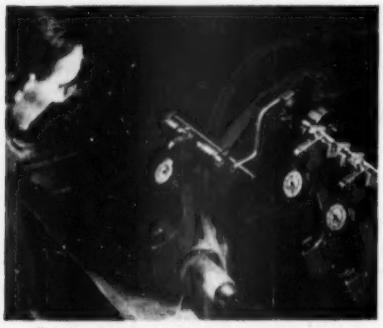
Johns-Manville *Asbestos* CORRUGATED TRANSITE

The operator who uses old style gages is working blind!

WITH OLD STYLE GAGES which merely show if a workpiece is within tolerance . . . or outsized . . . the operator can't see how he's doing until he's done it – he can't see dimensional variations *until* he has produced scrap. Modern Federal Indicating Gages let the operator *see* exactly how he's working, and if a dimension begins to vary, he can adjust his machine to bring the workpiece within tolerance *before* rejects are produced.

Think of the savings Federal Indicating Gages can make for you by eliminating costly scrap, by speeding assembly of parts which fit properly without reworking and by letting your high speed expensive machines continuously turn out workpieces which are dimensionally correct. Send in the coupon today for complete story. Federal Products Corp., Providence 1, R. I.



Continuous measuring gage shows size reduction as workpiece is ground — no over-grinding.

FEDERAL

Largest manufacturer of indicating type gages . . . exclusively

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1339 Eddy Street, Providence 1, R. I.

I would like to discuss a gaging problem with you.

I am interested in your latest improved gage or gages and enclose ☐ sketch ☐ blueprint showing the dimension(s) we wish to check.

Name.....

Company.....

Street.....

City.....

State.....

WHICH COMMUNITY TO BUILD IN

Begins on page 312

Where does this market get such goods now?

Is there an unfilled demand in the area now for any particular type of goods which are in reasonable supply elsewhere?

7. TRADE AND INDUSTRY

Are the wholesale, retail, and service establishments sufficient in number and variety? If some fields are not represented, why?

Is the shopping district attractive? Well merchandised? Does it have adequate parking and public transportation facilities?

Are the manufacturing concerns represented or dominated by one establishment? Are there sound reasons why? Or is diversification needed?

What are the principal products of the community? Is it reasonable to believe they will continue in demand?

Are there certain service shops which industry generally requires in the transportation area—tool and die makers, foundries, dry kilns, printing establishments, container manufacturers, machinery builders, etc.?

Does the number of local banks and the total of their deposits indicate that they are getting their share of commercial and industrial business? If not, is this a handicap to the availability of local capital?

8. INDUSTRIAL BUILDINGS AND FACTORY SITES

Does the community have an available industrial building? Does its general condition warrant use?

Are there limitations of size, ceiling height, allowable floor load, loading and unloading facilities, installed services, waste disposal, fire protection, local regulations, etc., which affect its usefulness?

If there is no building, are suitable sites readily available?

Can railroad sidings and other

ENGINEERING FIRMS SAY – "IDEAL for OUR JOB or OFFICE NEEDS"

MORE AND MORE BUSINESSMEN USE . . .

WHEELER

SOUND POWERED *Electric* TELEPHONES

- NO BATTERIES. No outside power.
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BULLDOG UNIT-VERSAL SWITCHBOARD

Switch units in the Unit-Versal Switchboard use BullDog's exclusive Vacu-Break arcing chamber that prevents dangerous arcs, and the patented Clampmatic Contacts that hold tight as a bolted connection. Interchangeable switches and circuit breakers available in sizes from 15 to 600 amperes.

always room for one more

Get the performance and protection you need *today*, the flexibility you'll need *tomorrow*, in one compact, low-cost switchboard. BullDog Unit-Versal Vacu-Break Switchboards are engineered to your specifications — adapt or expand swiftly to fit changing power requirements.

Only a screw driver and a crescent wrench are needed to assemble, install, extend or convert these modern switchboards. Removable front plates (shown above) provide quick access to wire gutters; louver plates permit bus bars to be extended and connected easily.

BullDog's famous Vacu-Break Switch Units give you extra-safe "quick-make, quick-break" protection. Furthermore, ample space can be provided for additional switches, breakers, meters, transformers, motor controls or any other special equipment you may need.

Get complete details on this amazing switchboard that lets you budget your power expansion. Write BullDog Electric Products Company, Dept. FM-93, Detroit 32, Michigan.

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BULLDOG

ELECTRIC PRODUCTS COMPANY

Speed-Up SCREW-SHOOTING and NUT-RUNNING with these

proven Milwaukee TOOLS

MODEL 624 Screw-Driver and Nut-Runner, Positive Type Clutch. AC or DC, 500 RPM. Handles Nos. 10 to 16 wood screws. Complete with assorted Bits, Finders, and Socket Driver.

$69.50

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Screw-Driver Attachment, adaptable to MILWAUKEE Electric Drills S-412 and S-512 . . . $29.50.

As a Nut-Runner, Model 624 handles Bolts and Nuts from No. 10 to ⅜"

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Exclusive, patented, adjustable Torque Release Clutch for any desired tension. Capacity: Wood Screws Nos. 4 to 12; Bolts and Nuts No. 4 to ¼". 600 or 1000 RPM; AC or DC.

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[illegible] ELECTRIC TOOL CO. [illegible] MILWAUKEE [illegible]

WHICH COMMUNITY TO BUILD IN

Begins on page 312

transportation terminal requirements be installed economically?

Are they so located as to present no problem in getting workers from home to plant?

Are there potential outlets for sewage and other wastes? Will a plant on this site adversely affect the operations of an adjacent existing plant?

Do any physical features of topography limit or extend its usefulness?

Can local or regional contractors handle industrial construction?

9. LOCAL GOVERNMENT—FINANCE

What is the state and local tax structure? Are assessment ratios and tax rates radically out of line when compared with other communities?

If much higher, are equivalently better community services provided?

Does the present bonded indebtedness of the community require too substantial a part of tax receipts for servicing charges?

Has local indebtedness come so close to the legal debt limit as to preclude needed improvement projects, especially if these would be needed to support a new industry?

10. "COMMUNITY" FACILITIES

Does the community contain a sufficient variety and number of facilities to make it an attractive place to live and work?

Would additional use of such facilities render them inadequate?

Is rental or purchase housing in town or within a commuting area especially scarce?

Will present or contemplated construction provide enough housing to fill existing needs? Expanded needs created by the personnel of a new industry?

Is the rental and realty purchase scale especially high compared with other communities in the area?

Turn the page

Station fitting

(Left) Greenwich Lavatory

PRACTICAL PLUMBING FIXTURES

FOR WASHROOMS

Kingston Closet

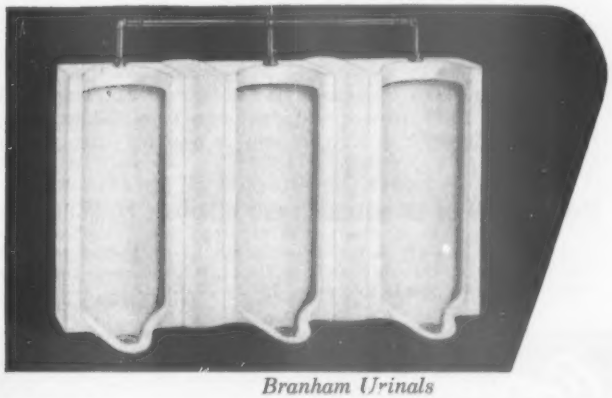
Kohler quality in fixtures for public washrooms insures practical design, reliable functioning, clean-cut appearance.

The fixtures illustrated are of vitreous china, thoroughly glazed and vitrified by long firings at high temperatures. Surfaces are lustrous, glass-hard, easy to clean. Fittings are chromium-plated, sturdy.

The Greenwich lavatory has a 5-inch back, ample basin, integral soap dish, Centra mixer fitting with Synchro pop-up drain. Twin-purpose Station fitting is also available, with lower handle to control water-flow at spout and self-closing upper handle to operate sanitary bubbler for drinking.

The Kingston wall-hanging closet, Downing floor closet and Branham 3-urinal battery are hygienic, smooth-acting, thorough. Write for catalog.

Downing Closet



Branham Urinals

Kohler Co., Kohler, Wisconsin. Established 1873

KOHLER OF KOHLER

PLUMBING FIXTURES • HEATING EQUIPMENT • ELECTRIC PLANTS • AIR-COOLED ENGINES • PRECISION CONTROLS

HERE'S THE EXTINGUISHER YOU PICKED AS "EASIEST TO USE" OVER THREE OTHER LEADING BRANDS . . .

Randolph

Safety and Plant Engineers—here's how you voted: In a national survey recently completed, 100% of your replies stressed *ease of operation* as a major factor in Extinguisher selection. And on the basis of being "easiest to use", 86% of your replies specified Randolph over the nearest brand—66% specified Randolph over *three* other leading brands, *combined!*

With no nozzles to adjust, no valves to turn, Randolph Extinguishers are 100% panic-proof. Just snap from the bracket, aim and press the trigger. You KNOW how to use this extinguisher *just by looking at it!*

COMPLETE LINE OF EXTINGUISHERS AND AUTOMATIC EXTINGUISHING SYSTEMS

Make sure your plant is mobilized for fire . . . with easy to use, simplified RANDOLPH Equipment. Sizes from 2½ to 50 lbs. Manual and automatic systems. Write Randolph Laboratories, Inc., 4 E. Kinzie St., Chicago 11, Illinois.

WHICH COMMUNITY TO BUILD IN

Begins on page 312

Can local builders and financing institutions be interested in cooperating to fill any new needs?

Are industrial or residential insurance rates high?

Will the inclusion of new industrial risks without added protection raise these rates?

Are educational facilities suitable and could they be easily expanded if necessary?

Does the community have parks, playgrounds, community centers, libraries of which it is proud and which it would like to show an industrial prospect?

Are hospitals, doctors, dentists, and other professional people sufficient to handle present and future demands?

Are local banking or other financial services adequate?

Aside from the foregoing, there are several intangibles which, though difficult to measure and appraise, must be considered. Some of these can outweigh a favorable balance based on all tangible elements, and can make or break a plant otherwise poorly or well located.

Perhaps the most important is community attitude. A community may have everything to offer, insofar as tangible resources are concerned. However, if you sense that all its elements do not want you, move to the next town on your list.

Address prestige is also important, no matter what you make and sell. Telephones are busier on Park Avenue than on Skid Row. Your professional and technical staff will be happier and stay longer where they have access to recreational and cultural advantages.

Get factual answers to all these "community questions." Line them up on a dollar-and-cents basis as they will affect *your* costs, site by site, community by community. The column adding up to the lowest net cost should be the answer.

Photo courtesy of Biltrite Chair Co., Statesville, N. C.

Sanding serpentine curve on tapered seat slats

This BEHR-MANNING® ADALOX® Paper Belt on a Murdock Contact Sander does a fast, production-volume finishing job in a furniture plant. It increases sanding speed 25% over Open Drum sanding methods. The operation is typical of today's modern production sanding where the right coated abrasive teams with up-to-date machinery and methods to produce better finishes at lower costs.

YOUR FINISHING IS PROBABLY "DIFFERENT" but it may be substantially improved with new BEHR-MANNING coated abrasive application methods. Our Field Engineers will be glad to survey your operations and demonstrate new, recommended methods with the latest BEHR-MANNING quality abrasives — in your own plant or in a nearby BEHR-MANNING Demonstration Room. Take advantage of this service. Write Behr-Manning Corp., Troy, N. Y., Dept. FM-9.

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- SHARPENING STONES
- PRESSURE-SENSITIVE TAPES

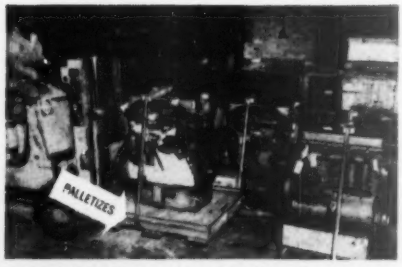
W-4

For the newest in coated abrasives...watch Behr-Manning!

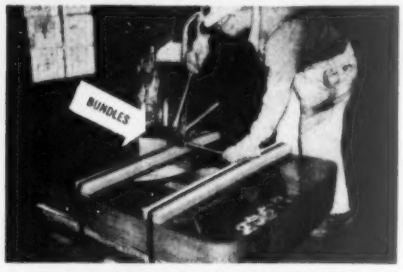
Acme Steel Strapping Insures S.A. *(Safe Arrival)*

Secures tractor parts for long-distance hauling . . . saves time and trouble for International Harvester

STRAPPING ON A TRACTOR. When International Harvester ships crawler tractors on open railroad flatcars, Acme Steel Strapping ties tool boxes, lubrication equipment and seat cushions in place for the journey.



SOLE SUPPORT for these IH Diesel engines is one Acme Steelstrap per engine. It secures the engine to a pallet for easy handling.

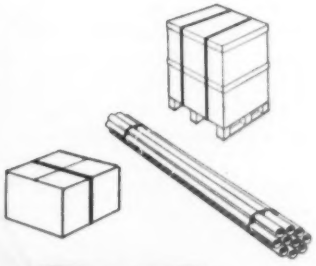


4,000 POUNDS of tractor dashboards are bundled together with Acme Steel Strapping for delivery from one International Harvester plant to another.

Whenever you receive anything secured with Acme Steel Strapping, you know that the shipper has taken care to get it to you safe. He has also beat the threat of damage-in-transit and has cut the cost of packing and shipping, too.

Acme Steel Strapping does all these things. It makes packing and loading easier and faster. It provides better protection during shipment, and helps insure S.A. (Safe Arrival).

Almost certainly, Acme Steel Strapping or Acme Steel Stitching Wire methods can help somewhere in *your* operation. If you have any kind of a shipping or materials-handling problem, we may have just the idea you need. Write Acme Steel Products Division, Dept. FMM-93, ACME STEEL COMPANY, 2840 Archer Avenue, Chicago 8, Illinois.



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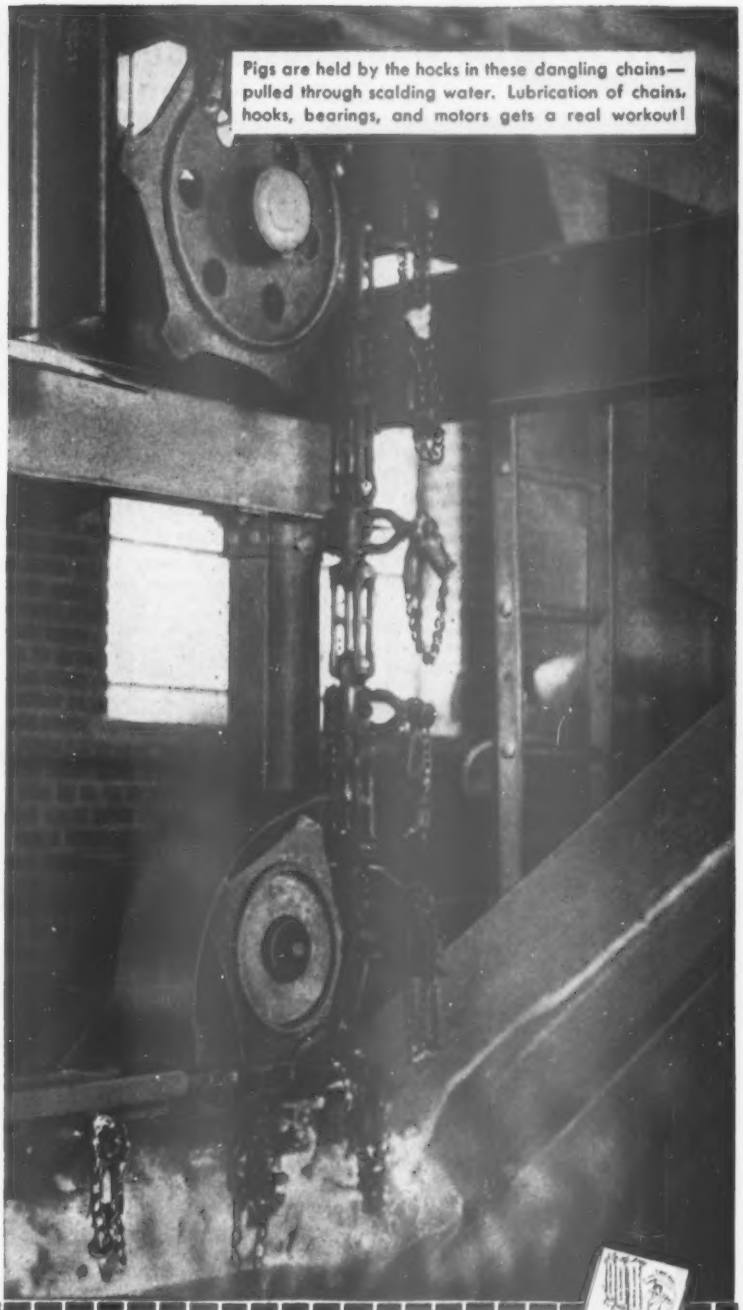
POCO HTB GREASE

hangs on through HEAT and WET!

Proves usefulness over wide range of temperature and moisture conditions.



Pigs are held by the hocks in these dangling chains—pulled through scalding water. Lubrication of chains, hooks, bearings, and motors gets a real workout!

In meat packing plants, as in many others, POCO HTB Grease is widely used with outstanding success as a general purpose lubricant. High film strength and adhesiveness over a wide range of temperature and moisture conditions make this possible.

POCO HTB is one of a group of Pure Oil multi-purpose industrial lubricants that you can turn to advantage to simplify your lubrication practice—and reduce your lubricants inventory.

Find out more about this versatile compact line of oils and greases designed to do so many jobs equally well. In most plants no more than six lubricants are needed to do the entire lubrication job with complete success. By reducing the number of lubricants used in your plant to six or less, you can slash application costs, minimize waste and error.

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KEEP IT PURE, AND SIMPLE!

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This crane is ideal for buildings wherein headroom is a factor and maximum lateral movement is desired.

It's a three-motor, floor-controlled crane suspended from three I-beams. Note that the bridge clears the side columns by mere inches.

This permits the trolley to travel unusually close to the walls affording maximum use of the floor area.

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100% ACTIVE — 100% SAFE!

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Dilute a little CINDET in HARD or SOFT water . . . apply with clean mop . . . let foamy, clean-looking suds stand 5 or 10 minutes . . . scrub only if necessary, and rinse thoroughly. The result: AMAZINGLY BRIGHT, CLEAN FLOORING.

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BOOKS

For Plant Engineers

TECHNIQUES OF PLANT MAINTENANCE AND ENGINEERING—1953

Published by Clapp & Poliak, Inc., 341 Madison Ave., New York. 288 pp. $6.

Here's a must for every plant and maintenance engineer's bookshelf. This book covers all phases and aspects of maintenance and plant engineering for small, medium, and large size companies in many industries.

It is based on discussions at the technical sessions held concurrently with the Fourth Plant Maintenance Show at Cleveland last January. These sessions were sponsored jointly by the American Society of Mechanical Engineers and the Society for the Advancement of Management.

The 859 questions and answers at the general and sectional conferences, one of the highlights of the program, are reproduced in full. (Many of these have already been published in FACTORY.)

The record of the proceedings at the general and sectional conferences contains subjects of general interest to all plant men, as well as five sessions on maintenance, divided according to plant size, and three on plant engineering, similarly divided.

Proceedings at the 21 roundtables are summarized in a narrative style. Ten deal with definite problems facing every maintenance man and plant engineer. Eleven others are devoted to various industries.

Also included in this book is an opinion poll on how various maintenance problems should be handled. The voting results published indicate how the conferees' plants solve particular problems.

Turn the page

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and this Vibrating Screen helps make it

This Ripl-Flo screen is one of six different types of vibrating screens made by Allis-Chalmers to meet the sizing, cleaning and de-watering needs of many industries.

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GENERAL MACHINERY DIVISION

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COSMOLUBE 101 & 102

Non-melting, non-separating, versatile grease

This is a new grease that has no softening or melting point! It is a bentone-bodied grease, ideal for pumps handling hot liquids and applications at elevated temperatures in steel mills, foundries, etc. It is water resistant, oxidation inhibited, will not separate and can be used in conventional greasing equipment.

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BOOKS

Begins on page 326

Book Briefs

MANUFACTURING MANAGEMENT

This book provides a good reference for men in managerial positions, although it was written primarily as a text. Covers all activities closely related to the management of any company. By Franklin G. Moore. Richard D. Irwin, Inc., Homewood, Ill. 832 pp. $8.

STANDARD COSTS FOR MANUFACTURING

Here's a book on standard costs that contains something for every member of the plant operating group. Second edition, with additional information and timely problems not in the first edition, published in 1947. This comprehensive study should be a mighty useful addition to any company's library. By Stanley B. Henrici. McGraw-Hill Book Co., Inc., New York, 336 pp. $5.50.

PIPEFITTERS HANDBOOK

A good reference for plant engineers. Gives quick answers to problems of pipe bending, layout, and installation. By Forrest R. Lindsey. The Industrial Press, New York 13. 282 pp. $6.

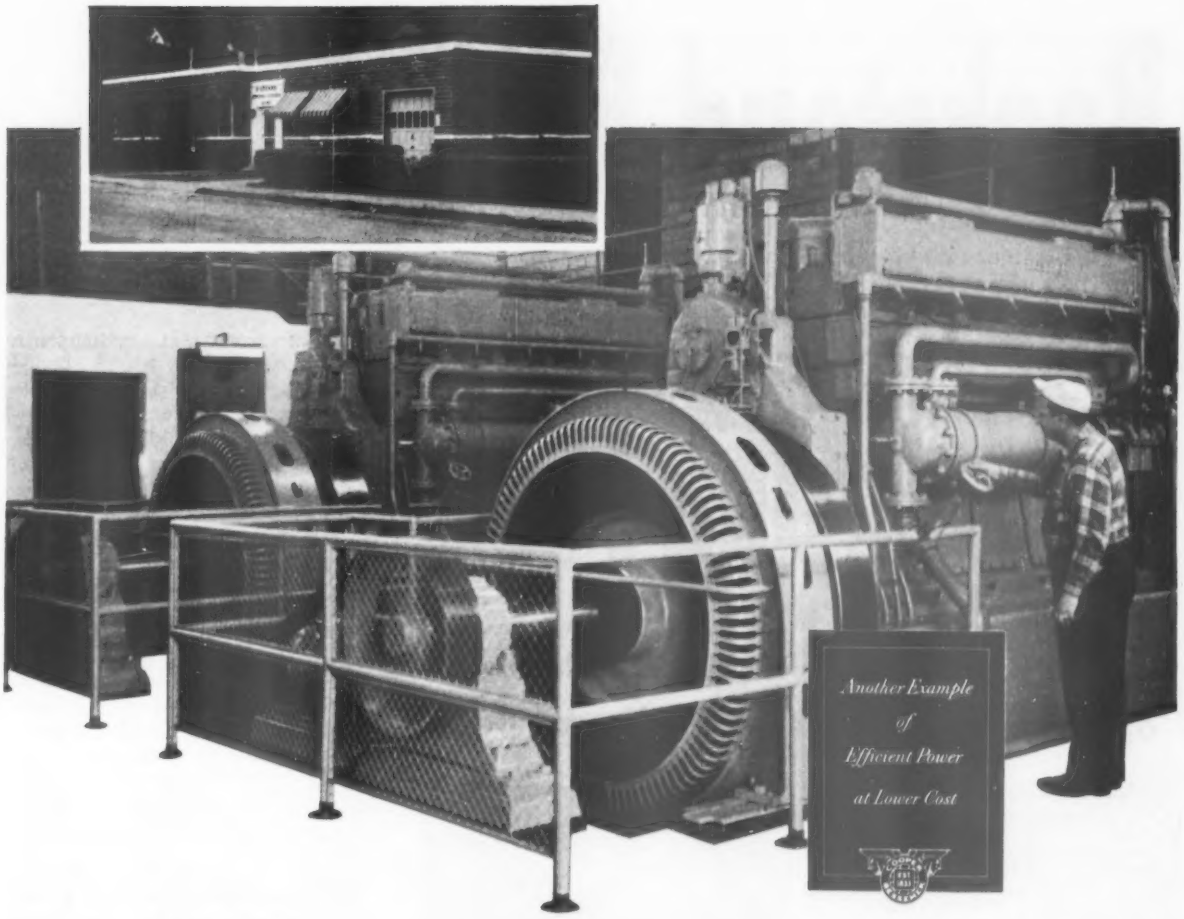
PAY CONTRACTS WITH KEY MEN

A report of 188 arrangements used to attract and hold key men. Covers 40 industries, from aircraft to zinc. By V. Henry Rothschild II and William J. Casey. Business Reports, Inc., Roslyn, N. Y. 213 pp. $12.50.

INTERNAL AUDITING FOR MANAGEMENT

An explanation of the relationship of internal auditing to management controls. By Frank A. Lamperti and John B. Thurston, Prentice-Hall, Inc., New York. 500 pp. $7.95.

Turn the page



How McGregor turned a Power Problem into $10,000 yearly profit!

TEN years ago, undependable electric power service forced McGregor, Iowa, to build their own plant.

It has proved to be a very profitable investment. Not only is the plant paying for itself . . . last year a net profit of $10,711.62 remained after expenses, depreciation, and bond retirement.

The McGregor plant is powered with two Cooper-Bessemer JS-5 diesels driving 260 kw generators. These atmospheric engines, shown above, are still giving extremely low fuel consumption on 23 gravity diesel fuel oil. Each engine runs four days, continuously. Lube oil is removed, cleaned, and replaced in one engine during the alternate 4-day period. Both engines are occasionally operated at the same time during peak periods.

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Armour Backstand Belts save 2 full hours per operator per day for steel tube company*

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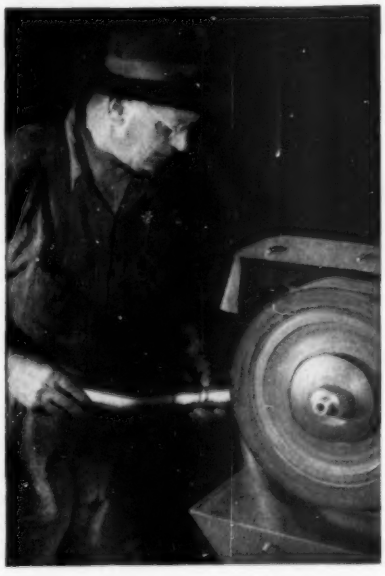

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BOOKLETS

Begins on page 326

HAUCK INDUSTRIAL COMBUSTION DATA. A mighty useful handbook on industrial heat-processing applications. Gives technical data on the selection, operation, and maintenance of oil and gas combustion equipment. Hauck Manufacturing Co., 124 Tenth St., Brooklyn, N. Y. 169 pp. Free.

HANDBOOK OF ACCIDENT PREVENTION FOR BUSINESS AND INDUSTRY. Discusses the conditions to be controlled for safe operation. Especially for the small business manager and the department supervisor. National Safety Council, 425 N. Michigan Ave., Chicago 11. 93 pp. Members $1.50, non-members $3.

SAFETY CODE FOR MECHANICAL POWER-TRANSMISSION APPARATUS. Many changes have been incorporated in this new edition of the American Standard Safety Code for mechanical power-transmission apparatus. American Standards Assn., 70 E. 45th St., New York. 49 pp. $1.

INDUSTRIAL RESEARCH AND THE ATOMIC FUTURE. How great will be industry's participation in the atomic energy program in the immediate future? This booklet contains addresses on this subject given at the 57th Annual Congress of American Industry. National Assn. of Manufacturers, 14 W. 49th St., New York 20. 39 pp. Free.

APPROVED EQUIPMENT FOR INDUSTRIAL FIRE PROTECTION. Pictures, diagrams, and data on fire protection equipment that has been tested and passed by the Factory Mutual Laboratories. Also, a short description of testing procedure. Factory Mutual Laboratories, 184 High St., Boston. 164 pp. Free.

Turn the page

◆ Now you can get quick "over-the-counter" Roller Chain Drives in all standard speed ratios and popular horsepower capacities.

The new Diamond Chain "balanced" combination stock inventory includes packaged standard Roller Chains in a range of pitch sizes—Taper Lock Sprockets with replaceable bushings, and finished Fixed Bore Sprockets in the smaller sizes (that requires no re-working) complete with keyways and setscrews.

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CONVEYORS

Shipping platform.—Warehouse.—Production and processing departments.—Any place at all! You'll be amazed at the effortless operation of "Streamliner" Gravity Roller Conveyors. They cut down unit handling costs, physical strain and fatigue. What's more, they require very little maintenance.

"Sreamliner" Gravity Roller Conveyors are "custom-engineered" in several types to meet special as well as standard operations. No doubt you can use such a cost-cutting conveyor in your plant. To get examples of these conveyors in action, write for Bulletin 100.

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BOOKLETS

Begins on page 326

IMPROVED MATERIALS HANDLING IN SMALL PLANTS. Aimed at helping small businesses increase efficiency by improving materials handling methods. U. S. Government Printing Office, Washington 25, D. C. 42 pp. 20¢.

RECOMMENDED PRACTICE FOR SUPPLEMENTARY LIGHTING. Here's a guide to setting up extra-ordinary lighting for critical seeing tasks in industry. Illuminating Engineering Society, 1860 Broadway, New York 23. 16 pp. 50¢.

RESEARCH IN PLASTICS. A progress report on an M.I.T. research project aimed at defining the behavior of plastic materials. Eighteen major plastics manufacturers are supporting this venture in basic research. Manufacturing Chemists Assn., Inc., Empire State Bldg., New York 1. 16 pp. Free.

TAYLOR FORGE. A monthly booklet designed to improve the dissemination of technical data on piping and pressure vessel work. Taylor Forge & Pipe Works, P. O. Box 485, Chicago. 46 pp. Free.

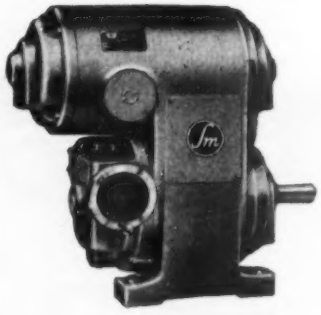
PROFITS IN PERSPECTIVE. This graphic analysis of profits provides a better understanding of both the dimensions and the functions of corporate profits. National Industrial Conference Board, 247 Park Ave., New York 17. 31 pp. $1.

ADVANCED COST METHODS FOR GRAY IRON FOUNDRIES. Three booklets covering cost methods in the molding, melting, and core departments. Contains much useful information. Gray Iron Founders' Society, Inc., National City-E. 6th Bldg., Cleveland 14. 17, 9, and 11 pp. Free.

Tuna Packer Increases Production 20%

Speed-Trol variable speed drives increased production 20% and maintain our high quality of product, writes J. C. Miller, Superintendent of Westgate-Sun Harbor Co....we adjust speed of cleaning line according to size of fish and therefore always operate at full capacity... labor and maintenance costs are at a minimum ... Speed-Trol's streamlined design meets our high sanitary standards because it is easy to keep clean.

STERLING SPEED-TROL



GIVES YOU VARIABLE SPEED CONTROL NECESSARY FOR:

Equipment adaptation to: Sequence synchronization — operators' abilities — load variations due to differences in quantity, quality, weight, size, tension, hardness or shape of material to be processed, machined, conveyed, blended, mixed, etc.

Process control of: Temperature—viscosity—level—pressure—flow—etc.

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With Speed-Trol you get the maximum in production, plant efficiency, quality & profit.

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Plants: New York City 51; Chicago, Illinois Los Angles 22; Hamilton, Canada; Santiago, Chile Offices and distributors in all principal cities

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Note special tooth arrangement in this greatly magnified section.
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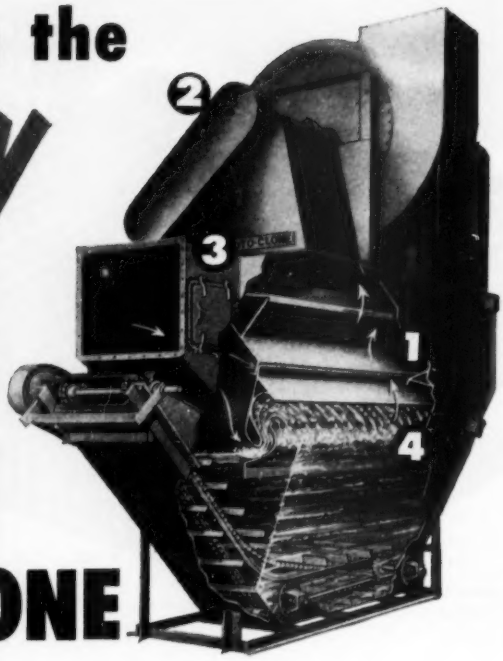
Introducing the NEW DESIGN 4 TYPE N ROTO-CLONE



—1—

Improved and simplified entrainment separators further reduce Type N's low cost maintenance.

—2—

Addition of 4 larger sizes to permit handling of exhaust volumes up to 50,000 cfm.

—3—

Additional access doors with improved hinges.

—4—

Greater range in permissible water over-flow rate from control box.

Famous AAF Hydro-static Dust Collector Loaded with New Features That Reduce Maintenance, Add Life and Lower Cost

The high dust collecting efficiency of the Type N ROTO-CLONE is written on the records of thousands of plants in scores of industries. Magnesium dust, buffing dust, lead oxide, lime and abrasive dust—all posed collection problems until the addition of this product to the ROTO-CLONE line.

The new Design 4 Type N, while retaining the proven cleaning action of its inverted S-shape water curtain, now adds features to further reduce and simplify maintenance, increase service life and *lower cost.*

Check the features listed here. No Gadgets—just sound engineering improvements that save you money both on first cost and every day of operation. For complete information on the new Design 4 Type N ROTO-CLONE write for Bulletin No. 277B.

Plus ADDED FEATURES FOR EACH TYPE N ARRANGEMENT

Arrangement B (Manual Sludge Removal)

1 Sloping sides for easier, faster manual clean-out.

2 Lower section designed for ready conversion from manual to automatic sludge removal.

Arrangement C (Continuous Sludge Disposal)

Heavier sludge ejector chain with longer chain pitch and slower speed—designed for longer life of all sludge ejector parts.

Arrangement D (Continuous Sluicing)

1 New drain control equipped with regulating orifice; built-in flushing connection and lubricated plug valve.

2 New water-supply control, complete with pressure regulator, which automatically assures constant water supply.

You Can Expect the Best from

American Air Filter
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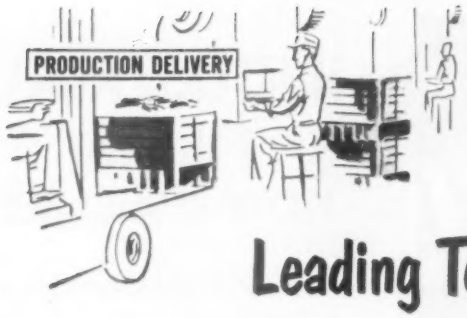
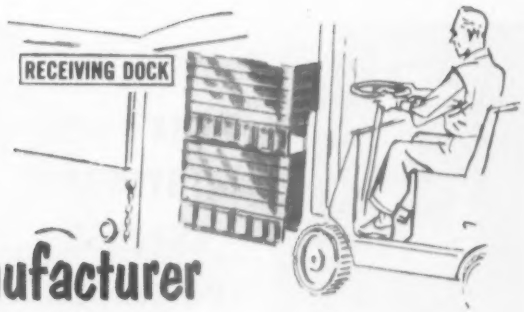
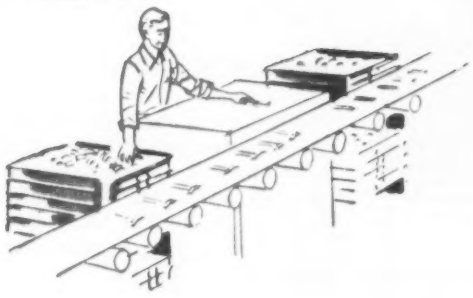




Leading Tool Manufacturer Saves $50,000 First Year *With* POWELL PRESSED STEEL Since 1920 job designed containers



One of the nation's leading tool manufacturers discovered a savings of more than $50,000 in a single year following a modernization of his material handling methods. He had switched from the conventional bins, bags and hand pushed wheel carts to Powell all-steel containers handled by fork lift trucks. Following is a brief review of where and how the savings were effected.

RECEIVING DOCK—Here the rough stock entered the plant. Unloading 12 tons under the old method required 12 hours. By using the new method 12 tons were handled in an hour and a half with but two-thirds the labor force.

PRODUCTION DELIVERY—Delivering stock from bins to machines. A time check run at this point found the old method required 10 hours. The new method, with boxes used as portable bins, required but four hours.

ASSEMBLY—Finished parts to assembly floor. The same manpower accomplished this job in one-fourth the time formerly required.

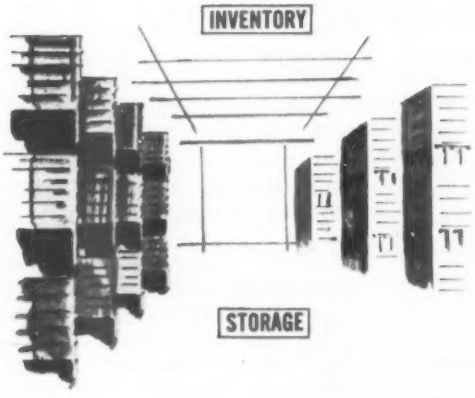
INVENTORY—Although the plant had considerably more material and parts at the time the Powell containers were used it cost 22 percent less to take the inventory.

STORAGE—The space saved, even though a greater inventory was carried, enabled the manufacturer to install a complete machine shop without building additions.

PARTS COSTS—Suppliers began quoting lower prices when containers were furnished. By sending their Powell containers into their suppliers, thereby eliminating packaging, they discovered that delivery, too, became more efficient.

A roundup of savings the first year the Powell containers were in operation came to more than $50,000. As the materials handling operation is refined even greater savings are anticipated.

If you're looking for additional space, more efficient handling of products and materials call in your nearest Powell representative Offices in principal cities.



The POWELL Pressed Steel Co.

Hubbard, Ohio

Originators of Cold-Formed All-Steel Handling Equipment

HERE'S ONE MAINTENANCE EXPENSE YOU CAN CUT 75%

Wilshire POWER SWEEPERS SWEEPING THE COUNTRY

WILSHIRE POWER SWEEPERS

WILSHIRE Power Sweepers are used in hundreds of different industries, in large plants and in small ones. They keep floors brighter and save on scouring and scrubbing costs because they pick up the dust without sprinkling or sweeping compounds. They prevent damage to machinery, parts and finished merchandise due to abrasive or corrosive dust. They keep walls, windows and lighting fixtures clean and bright. These are just a few of the extra dividends you get when you sweep with WILSHIRE. There's a Wilshire size and type for every sweeping need. *Free* demonstration proves it.

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DOUBLE
Your Battery Charging Capacity with a HERTNER Double Duty Unit . . .

For complete information on the Double Duty Unit call in your nearest electric truck representative or write direct for Bulletin No. 201-R.

- The Double Duty Unit is an amazing accessory that actually doubles the battery charging capacity of a Hertner single circuit motor generator battery charger.
- It is an automatic control device that works in conjunction with an "HX" or "KX" Hertner charger for charging two truck batteries in sequence.
- It is so simple to use — just plug in both batteries, turn two switches, and from there on everything is automatic. When both batteries reach full charge the unit automatically shuts off and two battery-powered trucks are ready for the morning shift.
- The cost of a Double Duty Unit is only a fraction of the cost of a second battery charger, yet it will accomplish the same results as two chargers.

Specify a Double Duty Unit with the purchase of an "HX" or "KX" Hertner Charg-O-Matic Battery Charger.

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Film Dept., Monsanto Chemical Co., 1700 S. Second St., St. Louis; or your local office of Modern Talking Pictures.

DUSTING demonstrates the tools and methods needed to make dusting easier and better. Emphasizes the importance of the job and use of various techniques. Revised from 1949 film. 16mm., color, sound, 19 min. Write to:

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FOR YOUR BENEFIT uses the interview situation to explain to a new employee the benefits and services provided by the company. Of interest to managements planning similar programs. Call or write to:

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ELECTRICAL WIRING WITH ALCOA ALUMINUM is a how-to-do-it for users of aluminum conductor. Shows the techniques of handling and joining, with details of various types of connections and applications. Pocket-size booklet containing checklist of points covered accompanies film. For plant engineers and electricians. 16mm., black and white, sound. Write:

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HERE'S AN ANSWER TO

questions about sponge rubber

MEETS ASTM SPECIFICATIONS . . . AVAILABLE IN FOUR DENSITIES . . . FIVE COLORS . . . IN ROLLS, SHEETS, STRIPS WITH OR WITHOUT ADHESIVE . . . DIE CUT FORMS

DUTCH BRAND Sponge Rubber is carefully manufactured and is fresh, live and of top quality. Available in rolls, sheets, strips or in special die cut forms or custom molded pieces to meet manufacturing needs. The availability of five colors is a big assist in working out product appearance. Because of its characteristics it serves many purposes in product manufacturing. Being available coated with adhesive or without simplifies production in many cases.

If you are now using sponge rubber in conjunction with manufacturing or are thinking of doing so, it will pay you to have full information on DUTCH BRAND Sponge Rubber.

DENSITIES

Natural Rubber	ASTM Specifications No. D1056-51T
No. 3832 Soft Density	RN11
No. 4022 Medium Density	RN12
No. 4030 Firm Density	RN13
No. 4031 Hard Density	RN14
Neoprene	
No. 3399 Soft Density	SC11
No. 3394 Medium Density	SC14

COLORS

1. Brown 2. Gray 3. Red 4. Green 5. Black

Other colors available where quantities warrant

THICKNESSES

1/8 inch to 1 inch inclusive

Here Are A Few Of The Many Uses For Sponge Rubber Today!

- Cushion vibration
- Prevent squeaking and wear
- Dampen sound
- Absorb shock
- Seal joints
- Make gaskets
- Mount delicate instruments
- Prevent skid
- Set glass in metal frame
- Insulate against heat or cold
- Prevent metal to metal contact
- Protect against scratch or abrasion
- Weatherstrip metal sash
- Prevent friction
- Prevent leaks
- Other specification requirements

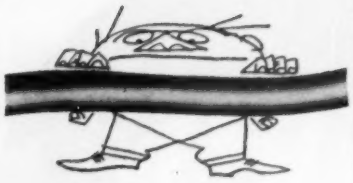
DUTCH BRAND

VAN CLEEF BROS. INC.
Manufacturers of Rubber Products
DIVISION OF Johns-Manville
7800 WOODLAWN AVE. • CHICAGO 19, ILLINOIS

PLEASE SEND SAMPLE OF FOLLOWING PRODUCTS

Name _____ Title _____
Company _____
Address _____
City _____ Zone _____ State _____
Distributor _____

go ahead and be a brute!



you don't have to baby

BRONCO 60 *Certified* **portable cords and cables**

Don't worry about oil, acids, alkalies . . . BRONCO 60 Certified has a jacket rich in oil and chemical-resistant Neoprene. It is **certified** to contain not less than 60% Neoprene **by weight.**

Sunlight? Ultra-violet rays? Ozone? They can't break down the 60% Neoprene protecting jacket on BRONCO 60 Certified.

As for heat . . . Flexibility and life are in no way impaired by temperatures as high as 167° F. BRONCO 60 Certified will not support combustion and bears the symbol P116BM to prove it.

Crushing holds no terrors. BRONCO 60 Certified is extra-resilient as well as extra-flexible because it is vulcanized by a unique method exclusively Bronco's. It "gives" under impact like a super-balloon tire.

Rough edges and sharp corners aren't much of a threat. In any inhabitable factory the edges aren't rough enough or the corners sharp enough to damage tough BRONCO 60 Certified.

A temporary overload is not likely to harm BRONCO 60 Certified because this cable is built with a generous extra margin of safety — electrical as well as mechanical.

WESTERN INSULATED WIRE CO.
Los Angeles 58, California
Sold nationally by Electrical Wholesale Distributors

INDUSTRIAL FILMS NOW AVAILABLE

Begins on page 336

FACTS ABOUT TAPS AND TAPPING is an educational film describing physical characteristics of taps, their proper use, and common abuses that can be avoided. Discusses proper selection of taps for various materials. 16mm., sound, color, 26 min. Distributed by:

Advertising Dept., Greenfield Tap & Die Corp., Greenfield, Mass., and branch offices in New York, Chicago, Detroit, and Los Angeles.

FILM PROGRAM OF THE MONTH

ELECTRONICS

The following films and film strips were selected by the Audio-Visual Center of The State College of Washington as a supplement to "What You Need to Know About Electronic Controls" (page 118).

BASIC ELECTRONICS uses schematic and animated drawings to explain basic principles of electronics as applied to industrial control systems. Shows elements and function of vacuum tubes. Good for basic training of technicians. Color, 17 min. Write:

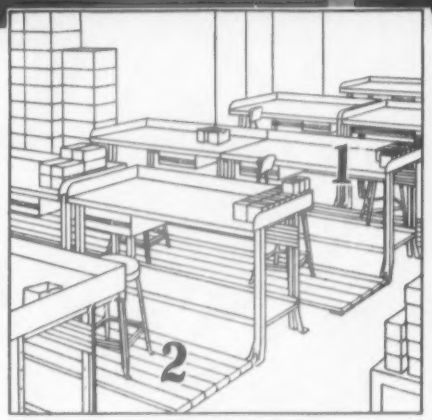
U. S. Air Force, Washington 25, D.C.; or

United World Films, 1445 Park Ave., New York 29.

ELECTRONICS AT WORK explains operation of several types of electronic tubes. It describes major functions of tubes, suggests ways they can be used to save time and increase production. 16mm., black and white, 20 min. For production engineers and

A PRACTICAL PACKAGING AREA—CUSTOM BUILT with Standard HALLOWELL Shop Equipment

Standard HALLOWELL Steel Shop Equipment makes it easy for you to set up a *custom-built* packaging area in your plant. All you have to do is lay out the space as you want it—and order the ready-made equipment from your HALLOWELL industrial distributor. Write us for details. STANDARD PRESSED STEEL CO., Jenkintown 11, Pa.



1. Work Benches 2. Stools and Chairs

Our Fiftieth Year : A START FOR THE FUTURE

HALLOWELL SHOP EQUIPMENT DIVISION SPS JENKINTOWN PENNSYLVANIA

the Emblem of Quality since 1875

FARADAY

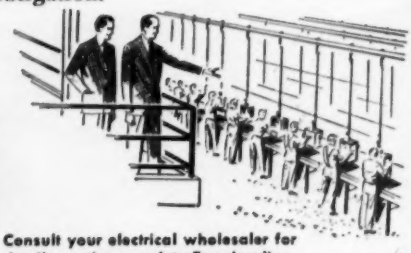
SIGNALS and SYSTEMS

ADD *SPEED . . . SAFETY*

Properly designed and installed signals and systems are real time-savers that smooth out many a plant problem—help stop wasted motion. And solving individual signaling problems has been Faraday's business for *seventy-eight years.* These years of experience assure correct plans, correct installation. To be sure that your signaling system is operating at top efficiency, check with Faraday. No obligation.

NECK-TYPE BELLS

VIBRATING HORNS



Consult your electrical wholesaler for details on the complete Faraday line.

HOLTZER-CABOT **FARADAY** STANLEY & PATTERSON

CONSOLIDATED BY:

SPERTI FARADAY INC. ADRIAN, MICH.

BELLS · BUZZERS · HORNS · CHIMES · VISUAL AND AUDIBLE PAGING DEVICES AND SYSTEMS

PLYMOUTH PLASTIC *Electrical* TAPE

Gives You 16% More Protection

Write for free sample on your company letterhead

PLYMOUTH RUBBER COMPANY, INC.

Makers of "SLIPKNOT" — Largest Selling Friction Tape in the World

CANTON, MASSACHUSETTS

FILM PROGRAM OF THE MONTH

Begins on page 338

management. Available free from:

Westinghouse Electric Corp., Film Div., Box 868, 511 Wood St., Pittsburgh 30.

ELECTRONICS IN ACTION gives a behind-the-scenes look at the electron and its application in industry. Action ranges from landing operations at an airport to work in the industrial research laboratory. 16mm., sound, color, 20 min. For information, write:

Raytheon Mfg. Co., Waltham 54, Mass.

CONTACT illustrates design and use of Cannon electro-connectors and disconnects. Shows adaptability of disconnects to a variety of industrial purposes. For engineers and designers. 16mm., color and sound, 30 min. Free from:

Cannon Electric Co., 3209 Humboldt St., Los Angeles 31.

SAFETY PRECAUTIONS FOR ELECTRONICS PERSONNEL shows some common hazards in servicing high-voltage electronic equipment. Emphasizes necessity of proper clothing and tools, safe operating procedures, and good housekeeping practices. Describes emergency treatment in case of accident. 16mm., black and white, 17 min. From:

U. S. Navy, Washington 25; or United World Films, 1445 Park Ave., New York 29.

RADIO-FREQUENCY HEATING illustrates both surface and deep-penetration radio-frequency heating and shows applications in industry. Of interest to production engineers and management. Color and black and white, 36 min. Available free from:

Westinghouse Electric Corp., Film Div., Box 868, 511 Wood St., Pittsburgh 30.

Turn the page

Only SEALMASTER Gives You Positive Locking Plus Easy Shaft Mounting

SEALMASTER BEARINGS now provide the first practical answer to positive shaft locking with easy shaft mounting. Just slip the bearing onto the shaft . . . tighten two set screws . . . that's all. This is made possible through ZONE HARDENING.*

SEALMASTER
BALL BEARING UNITS

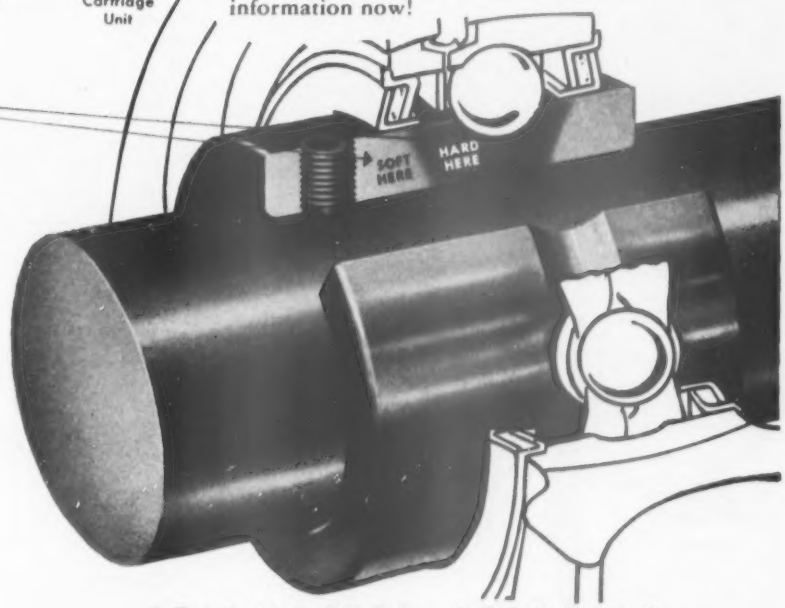
Cartridge Unit | Flange Unit | Take-Up Unit | Flange-Cartridge Unit

With Zone Hardening, the inner race of the bearing is hardened through the ball path section only. The rest of the race is left in its original, metallurgically soft state. The threads of the hardened set-screws bind firmly in this softer portion of the race and cannot work loose. This insures positive race-to-shaft locking for the life of the bearing.

In the machines you design, build or use, SEALMASTER Zone Hardening means better bearing performance, less maintenance and replacement costs. Write for full information now!

***ZONE HARDENING**

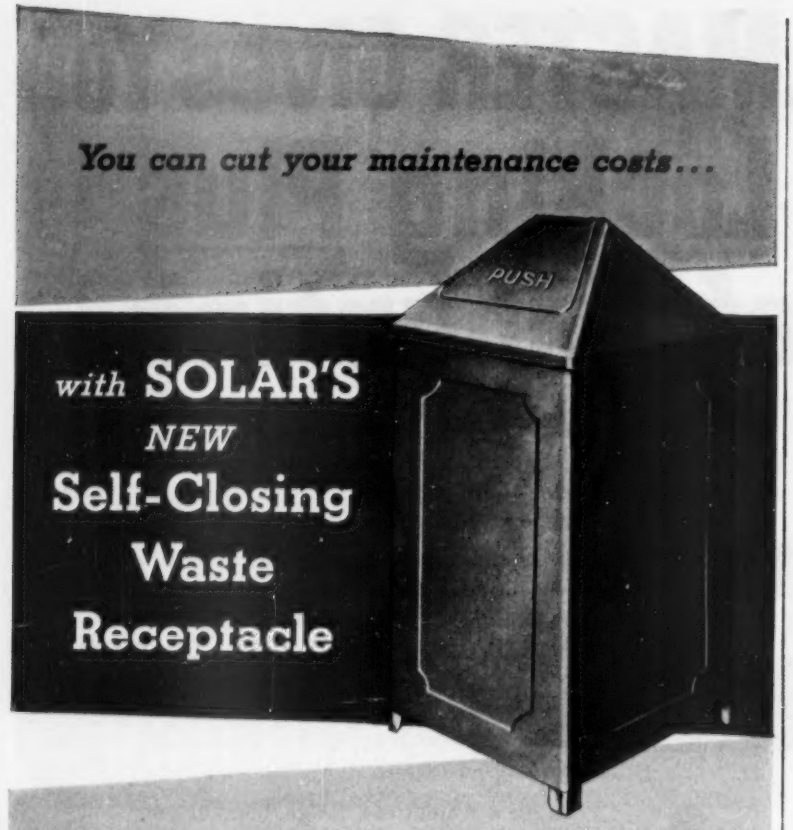
is a completely automatic heat treating process with timing controlled *to the tenth of a second.* In addition to enabling positive race-to-shaft locking, it provides a finer grained, metallurgical structure of uniform hardness in the ball path section. This gives better load carrying ability. Zone Hardening is patented . . . only SEALMASTERS have it.



SEALMASTER BEARINGS

A DIVISION OF STEPHENS-ADAMSON MFG. COMPANY
1 RIDGEWAY AVENUE, AURORA, ILLINOIS

FACTORY REPRESENTATIVES AND DEALERS IN ALL PRINCIPAL CITIES



With Solar's *New* line of the original self-closing waste receptacle, you will have a silent and trouble-free unit working for a neater, cleaner and safer condition.

It will pay you to investigate the many additional advantages in the new line—*old fashioned* efficiency with that "new look." Send for the bulletin that fully describes the *New* Solar Self-Closing Waste Receptacle.

SOLAR-STURGES Div.,
Pressed Steel Car Company, Inc.
Melrose Park, Illinois

7
SOLAR FEATURES
Safe to Use
•
Cuts Overhead
•
Cuts Cleaning Costs
•
Cuts Plumbing Expense
•
Reduces Fire Hazard
•
Quiet in Operation
•
Withstands Tough Usage

PSC

SEND FOR BULLETIN

Solar-Sturges Waste Receptacle Div.,
Pressed Steel Car Company, Inc.
Melrose Park, Illinois
Dept. FM-7

Gentlemen:
Please send me literature on Solar's new line of Self-Closing Waste Receptacles.

Name.....
Firm Name.....
Address.....
City.....Zone.....State.....

FILM PROGRAM OF THE MONTH

Begins on page 338

INDUSTRIAL ELECTRONICS TRAINING COURSE is the title of a series of 12 film strips prepared by General Electric. The course consists of the film strips with review booklets for each, and a manual. Course is available for preview preparatory to purchase. Film strips cannot be purchased singly. Price for the course, $150, from *General Electric Co., Visual Education Div., 1 River Rd., Schnectady 5, N. Y.*

Here are some of the titles:

Electronics — Today and Tomorrow presents an unusually thorough treatment of industrial photoelectric circuits. Shows methods of controlling speed in industry and several advantages of electronic control. Of interest to management and engineers. 30 min.

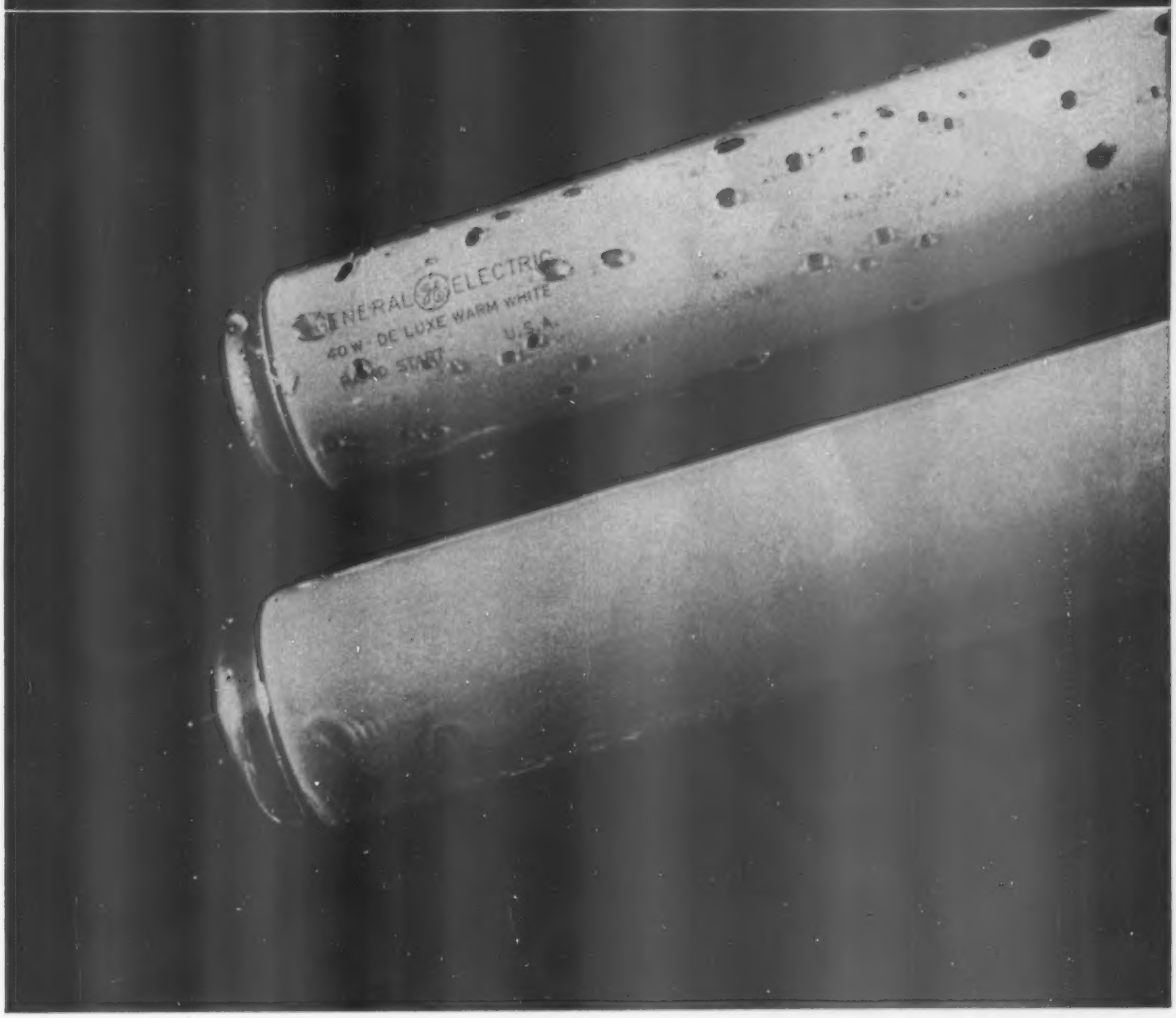
Electronic Control of A-C Power explains applications of electronic control for lighting and various types of welding. Of interest to engineers and welders. 30 min.

Electronic Relay Systems shows operation and application of various types, including photo relay, photoelectric relay, and time-delay relay systems. For production engineers and management. 24 min.

Photoelectric Relay Systems explains function and industrial applications of the phototube relay system. Also demonstrates ways of increasing production efficiency with electronic devices. Of interest to production engineers. 25 min.

Thy-Mo-Trol describes system of motor control and shows applications to get constant torque, constant horsepower, constant speed. Of interest to management. 25 min.

You expect the best value from G-E fluorescent lamps



Silicone coat on new G-E Rapid Start lamps helps them start quicker

Moisture in the air can make a fluorescent lamp slow to start. The wet film that condenses on the lamp is a good enough conductor to detour some of the electricity needed for proper starting.

General Electric has tailored a "raincoat" that stops this. It's made of silicone and breaks up the wet film into tiny droplets, leaving dry areas that interrupt the electrical contact. Less current is stolen. Starting is quicker, surer.

We call the coating Dri-Film*. The photo above shows the difference it makes. Moisture breaks up into droplets on the Dri-Film* lamp, forms a smooth coating on the ordinary lamp.

You get Dri-Film* on G-E Rapid Start lamps. It's invisible, won't rub off, helps assure you all the light you pay for. Many leading manufacturers have designed lighting fixtures to use Rapid Start lamps and their special Rapid Start ballasts. You *expect* the best value from G-E fluorescent lamps. Here's another reason you can.

For more information, write General Electric, Department 166-FM-9, Nela Park, Cleveland 12, Ohio.

*Reg. U. S. Pat. Off.

You can put your confidence in—

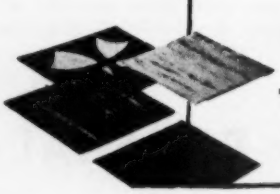
GENERAL ELECTRIC

The company president must see eye-to-eye with the maintenance man

Excessive amounts spent for flooring maintenance can come from only one source... profits! And, these too-high costs can be traced directly to flooring poorly suited to the area for which it was chosen.

That's why it is your responsibility to select the right floor... the one floor that will give the best service at the least cost... whether it be the durable, easy-to-clean beauty required in public rooms or the colorful, resilient flooring needed in lounges, kitchens, lobbies.

By consulting your Kentile Flooring Contractor, you can be sure of getting just what you need for every flooring installation... and getting the most efficient service for the lowest possible cost.



Call the Kentile, Inc. Flooring Contractor* for up-to-date information about these floors

- ✓ *KENTILE ASPHALT TILE*
- ✓ *SPECIAL (greaseproof) KENTILE*
- ✓ *KENCORK FLOORS AND WALLS*
- ✓ *KENRUBBER TILE FLOORS*
- ✓ *KENFLEX VINYL TILE*

KENTILE INC.

*If you don't know the name of your Kentile, Inc. Flooring Contractor look under FLOORS in your Classified Phone Directory or write Contract Dept., Kentile, Inc., 58 2nd Ave., Brooklyn 15, N. Y.

So Fast! So Easy! One Low Cost DeWalt does all of these...

Here's a small investment that pays off big for you, because it does so many jobs—quickly and economically. A DeWalt® Power Saw is the ideal answer to your plant maintenance and utility cutting problems.

DeWalt is a complete power unit in one machine. You rip, miter, bevel, tenon, dado, plough and make many other cuts. And you can also grind, sand, drill and even do light metal cutting. All these operations are performed quickly and easily, because DeWalt has amazing flexibility...cuts with lightning speed.

You get famous DeWalt precision and safety, too. The DeWalt Safety Guard gives maximum protection at all times.

So invest in a DeWalt today—for future savings. Send for illustrated catalog.

Available in five models from ½ to 10 H.P.

De Walt Inc. Lancaster, Pa.

DE WALT

POWER SAWS

Subsidiary of
AMERICAN MACHINE & FOUNDRY COMPANY
New York

Mail this Coupon Today!

De Walt Inc., Dept. FM-9, Lancaster, Pa.
☐ Please send me full details on the De Walt Radial Power Saw Line.
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NAME_____

ADDRESS_____

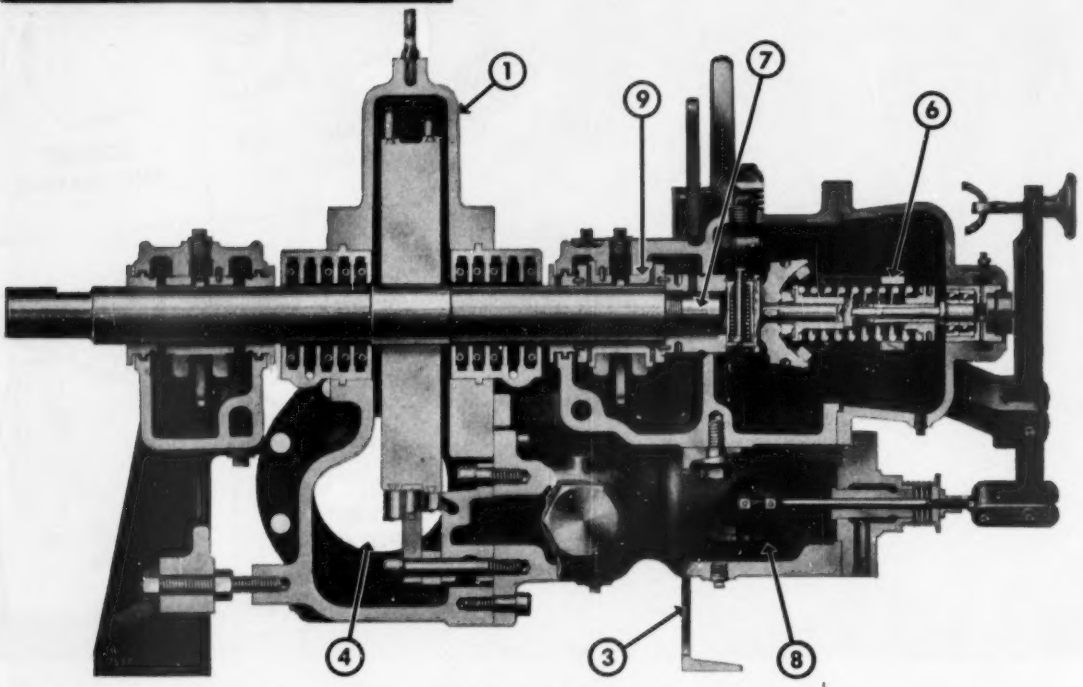
CITY_____ ZONE____ STATE_____

NEW DE LAVAL

HCB

SINGLE STAGE TURBINE

can be ordered from stock



1 Case and Cover Split Horizontally on centerline for ease of maintenance.

2 True Centerline Casing Support assures distortion-free radial expansion. *Not shown.*

3 Flexible Support at governor end provides for axial expansion.

4 Exhaust Opening either right or left side for installation flexibility.

5 Steam Strainer, protecting trip and governor valves, is *removable* for cleaning without breaking steam connections. *Not shown.*

6 Constant Speed Governor features governor weights pivoted around frictionless surfaces.

7 Complete Governor Assembly is now *replaceable as a unit.*

8 Balanced Single Seated Main Governor Valve has proportional flow characteristics for sensitive, positive control.

9 Shaft Locating Bearing of adjustable double collar type.

Horsepower: 100 MAX
Steam Pressure: 300 PSIG MAX
Steam Temperature: 550F MAX
Exhaust Pressure: 25 PSIG MAX
Speed: 4,000 RPM MAX
Steam Inlet: 2"–250# ASA FLG.
Exhaust: 6"–150# ASA FLG.
Weight: 1,200 LB

Here's the new De Laval HCB Single Stage Turbine which is now "on the shelf" . . . ready for immediate shipment. This mechanical drive turbine is simple, rugged, designed for long economical life and low maintenance. For example, note the true centerline casing support, the replaceable governor, the removable steam strainer. Investigate all the advantages of this versatile driver. It is ready to handle—*at low cost*—a variety of applications in your plant.

Send for new Bulletin 4206
which gives vital facts and figures

DE LAVAL *Mechanical Drive Turbines*

DE LAVAL STEAM TURBINE COMPANY

804 Nottingham Way, Trenton 2, New Jersey

DL309

ABOVE: Vital to the high production maintained by Gunnison Homes, Inc. is this 650-ton hydraulic press used to bond plywood panels into strong, durable wall sections.

LEFT: Handsome, precision built homes, like the Gunnison Coronado pictured here, are built in a matter of hours.

Answers a pressing need for Gunnison Homes, Inc. . . .

● Gunnison Homes, Inc., situated in New Albany, Indiana, is one of the leaders in the field of manufactured homes. Key to continuous production of precision built homes at the New Albany plant is the 650-ton hydraulic press, shown above, which was installed in 1947. This press processes ten plywood panels every cycle by the combination of heat and pressure . . . a tough job and one requiring reliable hydraulic performance to maintain production schedules.

STANOIL Industrial Oil was installed in the press when it was put into operation six years ago. STANOIL has stood the test of severe operation . . . with no evidence of oil deterioration being found during a recent inspection of the hydraulic system. Operation has been efficient. Minimum make-up oil has been needed to maintain the oil capacity of 450 gallons.

STANOIL
TRADE MARK
Industrial Oil

Find how STANOIL can benefit you by discussing this multi-purpose oil with a Standard lubrication specialist. You can contact him by phoning your local Standard Oil office. Or, write: Standard Oil Company, 910 S. Michigan Ave., Chicago 80, Ill.

What's YOUR problem?

Ralph E. Murnahan, of Standard Oil's Evansville office, is the lubrication specialist who keeps in constant contact with Gunnison Homes to make certain that there is no interruption of operation due to lubrication difficulties.

He is one of many lubrication specialists who make their headquarters in Standard's offices throughout the Midwest. These men have been specially trained in Standard's Lubrication Engineering Schools and, in addition, have a wealth of on-the-job experience.

To obtain the service of the lubrication specialist in your area, you need only call your local Standard Oil office. The lubrication specialist will discuss your lubrication problems with you . . . at no obligation to you, of course. He has a complete line of petroleum products to offer you, including:

SUPERLA Greases—Available in a wide range of consistency grades and in both lime-soap and soda-soap types. SUPERLA Greases cover a wide range of operations. These efficient products are comparable in quality with the highest type of special greases.

STANOLITH Greases—Because these unique lithium soap products possess the heat resistant properties of soda-soap greases and the water resistant properties of lime-soap greases, they offer a solution to lubrication problems caused by the presence of both heat and water.

STANDARD OIL COMPANY STANDARD *(Indiana)*

No more "painty" odors. No more complaints from workers, customers, patients, tenants.

Du Pont Announces

NEW ODORLESS
Color Conditioning Paints

Maintenance painting problems minimized in hospitals, schools, hotels, offices and other interior areas where paint odors cause inconvenience.

Now Du Pont Color Conditioning, the scientific maintenance painting plan that puts the right colors and the right paints in the right places, takes another big stride forward. Du Pont paint chemists have developed new formulas that make Du Pont Color Conditioning Paints odorless during application, with only a faint odor noticeable as the paint dries. This means that you can put Du Pont's painting plan to work *without* the annoyance often caused by paint odors.

OTHER DESIRABLE QUALITIES ADDED

In formulating these new paints, Du Pont has gone beyond the substitution of odorless solvents for regular solvents. Color Conditioning Paints have been completely re-formulated to provide easier brushing, quicker drying and better hiding. Light tints and white are more resistant to yellowing than ever before. And Color Conditioning Paints are formulated with alkyd resin— famous for insuring long-lasting good looks and protection.

LOWER MAINTENANCE COSTS

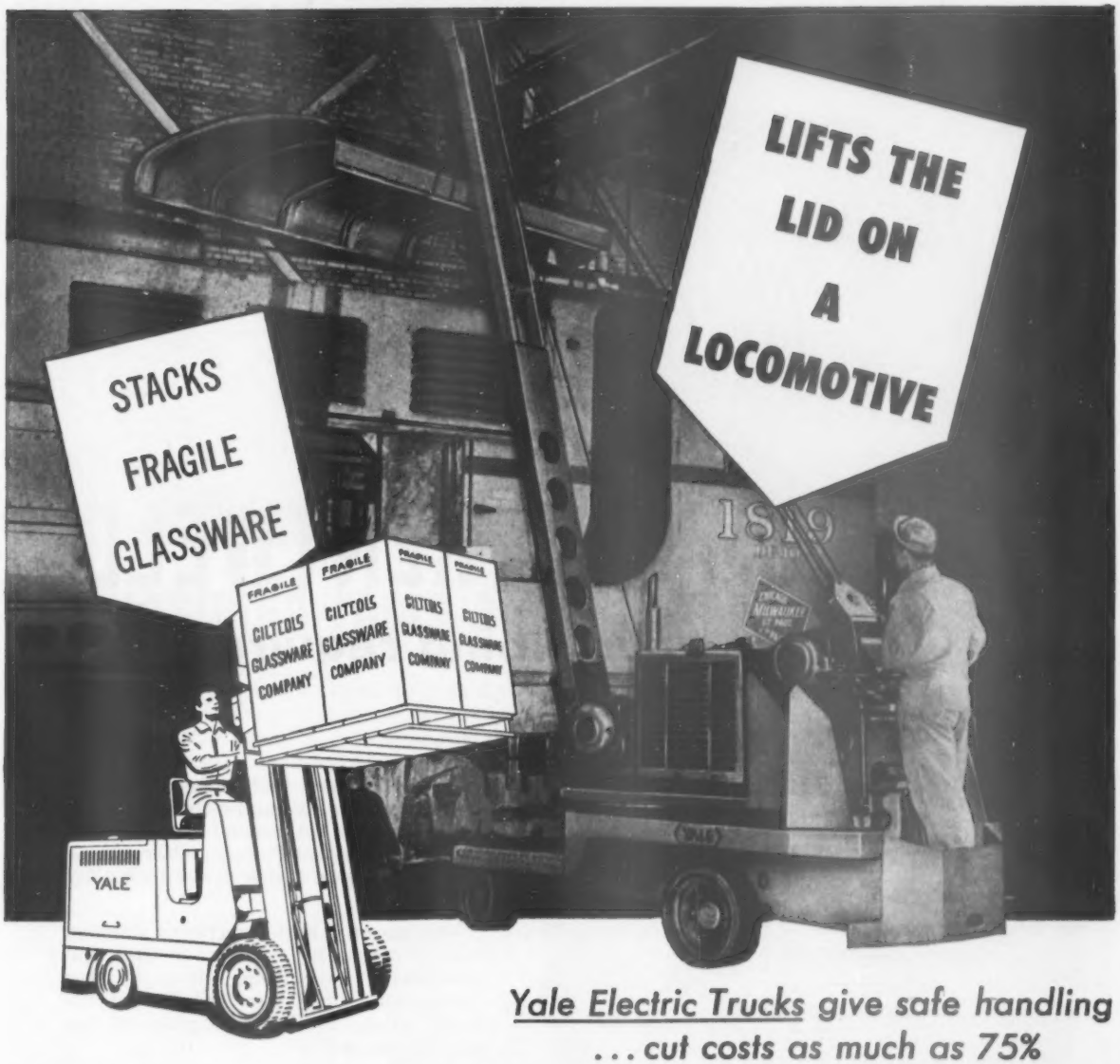
Du Pont Color Conditioning costs no more than ordinary maintenance painting . . . less in the long run. Why not see for yourself how it can improve morale and production . . . reduce accident rates for you. Write for further information to E. I. du Pont de Nemours & Co. (Inc.), Finishes Division, Dept. F-39, Wilmington 98, Delaware.

DU PONT
REG. U. S. PAT. OFF.

DU PONT
Color Conditioning
PAINTS

NOW ODORLESS

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*



Yale Electric Trucks give safe handling ... cut costs as much as 75%

DIFFERENT LOADS call for different equipment—and the comprehensive YALE line offers exactly the truck your job requires, whatever your business may be.

To keep down maintenance costs and assure 24-hour service, YALE Trucks offer such special features as: Hypoid Gears, Involute Spline Drive Shafts, and Yale Lift Channels. As a result, YALE users report unusual savings —with handling costs often reduced as much as 75%.

Choose the truck you need from YALE's wide variety of models, including Gas, Diesel, LP-Gas, Gas-Electric, and Electric in capacities up to 100,000 lbs. Attachments available for specialized handling jobs.

YALE*

MATERIALS HANDLING EQUIPMENT

*Registered in U. S. Patent Office

MAIL THIS COUPON TODAY

The YALE & TOWNE Manufacturing Co., Dept. 39
Roosevelt Blvd. and Haldeman Ave., Phila. 15, Pa.

Please send my free copy of *Picture story of Yale Materials Handling Equipment.*

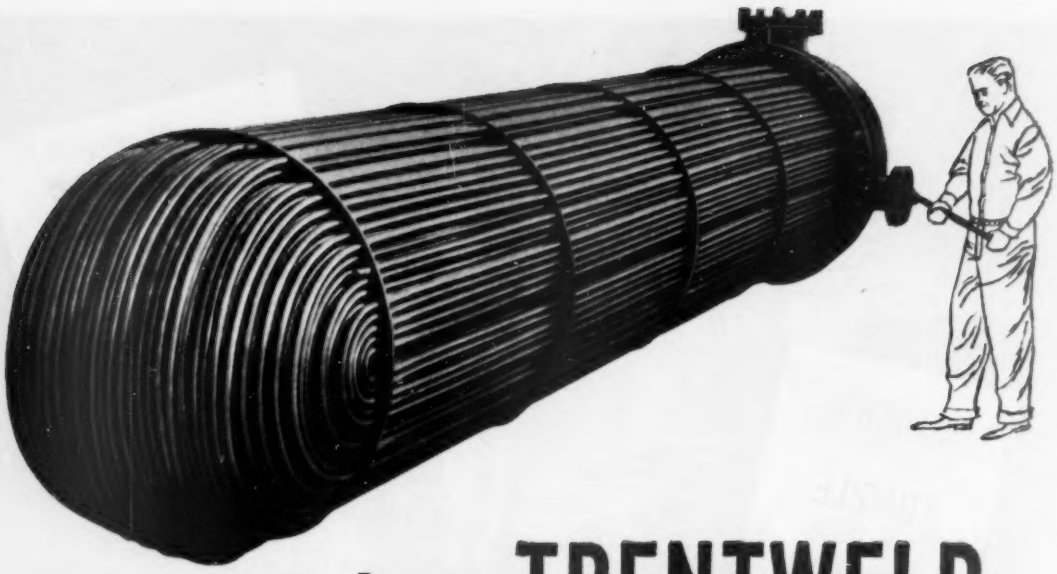
Company_____

Name_____ Title_____

Street_____ City_____ State_____

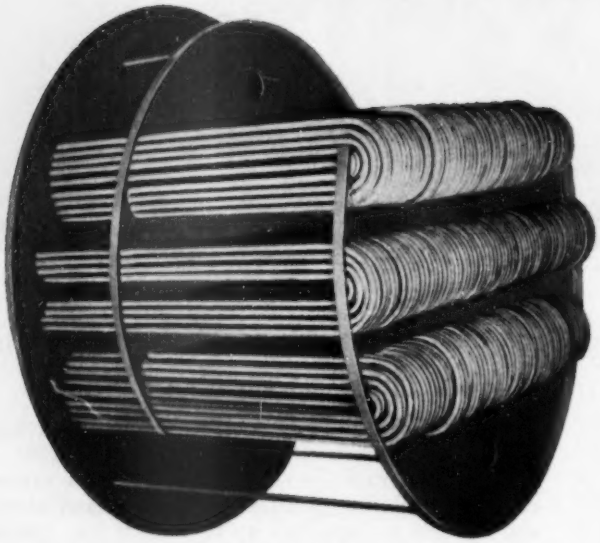
In Canada write: The Yale & Towne Mfg. Co., St. Catharines, Ontario, Canada

Gas, Electric, Diesel Lift Trucks • *Worksavers* • Hand Trucks • Hand and Electric Hoists • Pul-Lifts



you can't beat TRENTWELD

for *your* tubing requirements



Heat Exchangers built by Vulcan Manufacturing Division, Vulcan Copper & Supply Co., Cincinnati, Ohio.

Whether it's heat exchangers or milking machines, chemical equipment or fountain pens, or any of a thousand other applications, you just can't buy better tubing than TRENTWELD stainless and high alloy tubing.

One reason is that TRENTWELD stainless *welded* tubing is a product of tube mill specialists . . . worlds apart from job shop fabrication. All of our facilities are devoted solely to the production of top quality tubing.

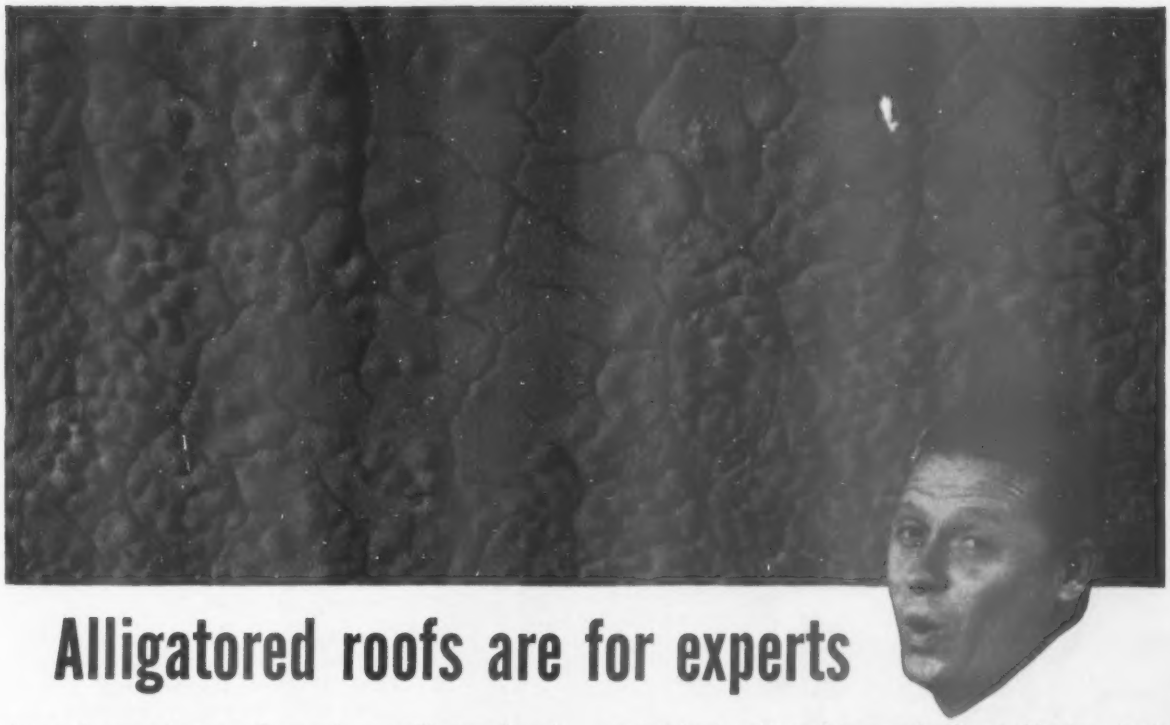
TRENTWELD is made by an exclusive fusion-welding process in which no filler rod is used. Each piece has an accurate uniformly sound weld that is indistinguishable from the parent metal and just as strong and corrosion-resistant.

TRENTWELD is available in an extremely wide range of sizes from ⅛" to 40" O.D. and up, in most grades, gauges and finishes. Trent engineers are experienced in solving tubing problems in many fields. Write now and let us help with *your* application problem.

TRENTWELD

STAINLESS STEEL TUBING

TRENT TUBE COMPANY, GENERAL SALES OFFICES, EAST TROY, WISCONSIN (Subsidiary of CRUCIBLE STEEL COMPANY OF AMERICA)



Alligatored roofs are for experts

As you know only too well, capping an alligatored roof is for experienced maintenance people. It takes a lot of preparation—cleaning, patching, masking around parapets and obstructions. Then, *what* you put down on the roof and *how* you do it make the difference between long-lasting, dependable service and a stop-gap job.

Fiberglas Corotop* introduces new economy to roof maintenance and results in a tough, ever-plastic, long-lasting surface just made for heavy duty. Corotop resists heat, cold, moisture and will not alligator, check or blister . . . because Corotop is made from specially processed emulsified asphalts reinforced with a flexible, non-rotting mat of fibers of glass. And Corotop is applied by Fiberglas-approved roofers to assure top-quality results.

It will pay you to investigate Fiberglas Corotop. Get all the facts by filling in the coupon and mailing it today. No obligation, of course.

1. Roof must be properly prepared—cleaned and patched, if necessary. A strip of Corotop Liquid Asphalt is then sprayed on—into this is immediately imbedded, or unrolled, a layer of Fiberglas Corotop Roofing Mat.

2. Second coat seals first two layers, integrates reinforcement mat with asphalt. When roof has been fully covered with first two steps it is left to dry for 12 hours, or overnight. Corotop emulsion can be applied by brush or spray.

3. Entire roof is covered with final top coating. Finished job assures tough, long-lasting surface that resists heat, cold, moisture and will not tend to alligator, check or blister.

OWENS-CORNING FIBERGLAS CORPORATION
GENERAL PRODUCTS DIVISION • INDUSTRIAL CONSTRUCTION MATERIALS

OWENS-CORNING FIBERGLAS

MAINTENANCE PRODUCTS

*Fiberglas (Reg. U.S. Pat. Off.) Corotop, Noise-Stop and Aerowrap are trade-marks of Owens-Corning Fiberglas Corporation.

OWENS-CORNING FIBERGLAS CORPORATION
Dept. 85-I, Toledo 1, Ohio

Please send complete details about Fiberglas Corotop for roof maintenance, including sample folder, literature and prices. No obligation.

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Firm _____

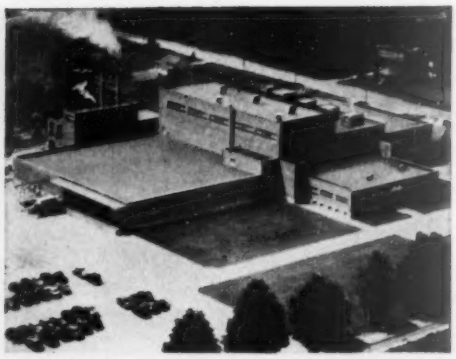
Address _____

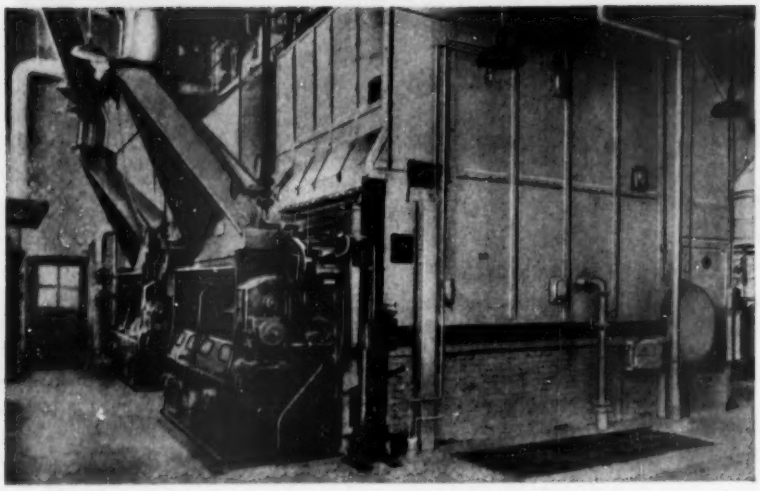
City _____ State _____

"COAL'S BEST FOR OUR MODERN PLANT!

It's low in cost... It's clean and convenient!"

says G. W. Peters, Engineering Manager
M&R DIETETIC LABORATORIES, INC.
makers of PREAM & SIMILAC





"We made a careful study of fuels and burning equipment before building our modern new plant in Sturgis, Michigan. This plant was designed to produce baby food. So the steam plant has to be clean and dust-free as well as economical to operate. Also, we wanted a fuel we could store safely and easily in order to insure ourselves against any shortages.

"We decided on bituminous coal—and the up-to-date installation shown here. It certainly fills the bill on every count. Our modern combustion equipment makes coal far more economical than any other fuel. Up-to-date coal and ash handling give us convenient operation completely free of dust nuisance."

Additional case histories, showing how other types of plants have saved money by burning coal the modern way, are available upon request.

Discover for yourself the great advantages of coal burned the modern way. Call in a consulting engineer. He'll show you how today's combustion equipment can give you 10% to 40% more power from a ton of bituminous coal than from equipment used only a few years ago. He'll show you how modern labor-saving coal and ash-handling equipment make a coal-fired installation clean, convenient, and dust-free.

If you plan to remodel or build a new plant, be sure to look into the low cost and convenience of bituminous coal. Consider coal's other advantages, too. It has reserves that are virtually inexhaustible. America's bituminous coal mining industry is the most efficient and productive in the world. With bituminous coal, you can be sure of plenty of fuel at relatively stable prices now and for years to come.

If you operate a steam plant, you can't afford to ignore these facts!

BITUMINOUS COAL in most places is today's lowest-cost fuel, and coal reserves in America are adequate for *hundreds of years to come.*

COAL production in the U.S.A. is highly mechanized and by far the most efficient in the world.

COAL prices will therefore remain the most stable of all fuels.

COAL is the safest fuel to store and use.

COAL is the fuel that industry counts on more and more—for with modern combustion and handling equipment, the inherent advantages of well-prepared coal net even bigger savings.

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A Department of National Coal Association, Washington, D. C.

FOR HIGH EFFICIENCY ★ FOR LOW COST

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1000 pound AIR HOIST

for **SPEED...**

Lift rate... over 40 ft. per minute!

SIZE...

Overall length 10¼", weighs only 28½ lbs.

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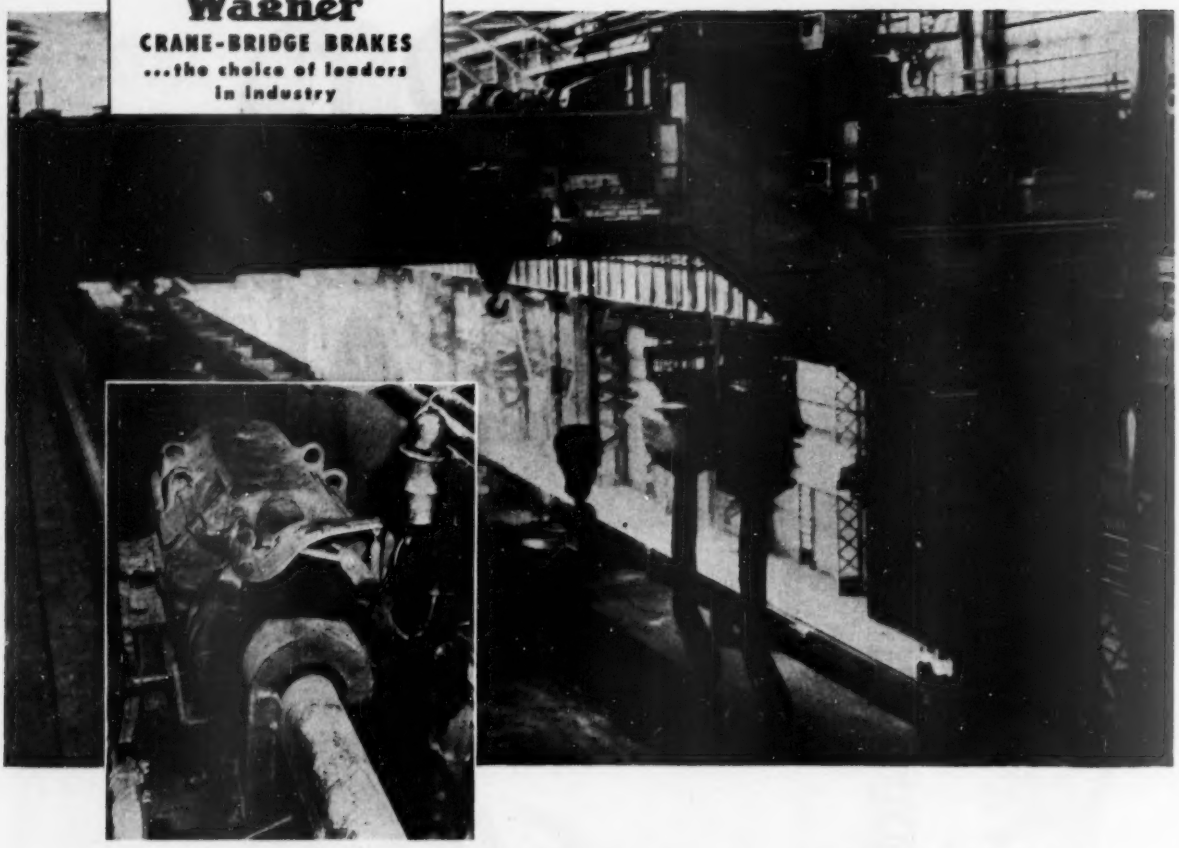

Wagner *POWERED* Hydraulic Crane Bridge Braking

Lengthens life of crane bridge reductions and brakes ...Reduces physical strain on operators...

At the U. S. Steel Corporation's Homestead Works No. 5 Open Hearth, a 300 ton ladle crane was equipped with a Wagner *Powered* Hydraulic Bridge Brake System a little over a year ago.

This system solves the problem of moving a ladle of metal from mold to mold, a distance of 54 inches, with great accuracy and with smooth stops to minimize the swing of the ladle.

The tip toe button operation of this new system has greatly reduced arm and leg strain for the crane operators. Mechanical wear on the crane bridge reductions and brakes has been reduced, and the life of the brake shoe lining has been lengthened from six weeks to four months—nearly triple!

Wagner powered units can be added to your present Wagner Hydraulic Bridge Brake System. Investigate this new method of braking today—write for Bulletin IU-36 which fully explains and describes Wagner Powered Hydraulic Braking.

Replacement Lining and Brake Wheels

Wagner offers the perfect combination of brake wheel and non-scoring lining for replacement needs. Wagner Brake Lining is specially designed and manufactured to meet the exacting service requirements of industrial braking. It is available in rolls, blocks, and discs.

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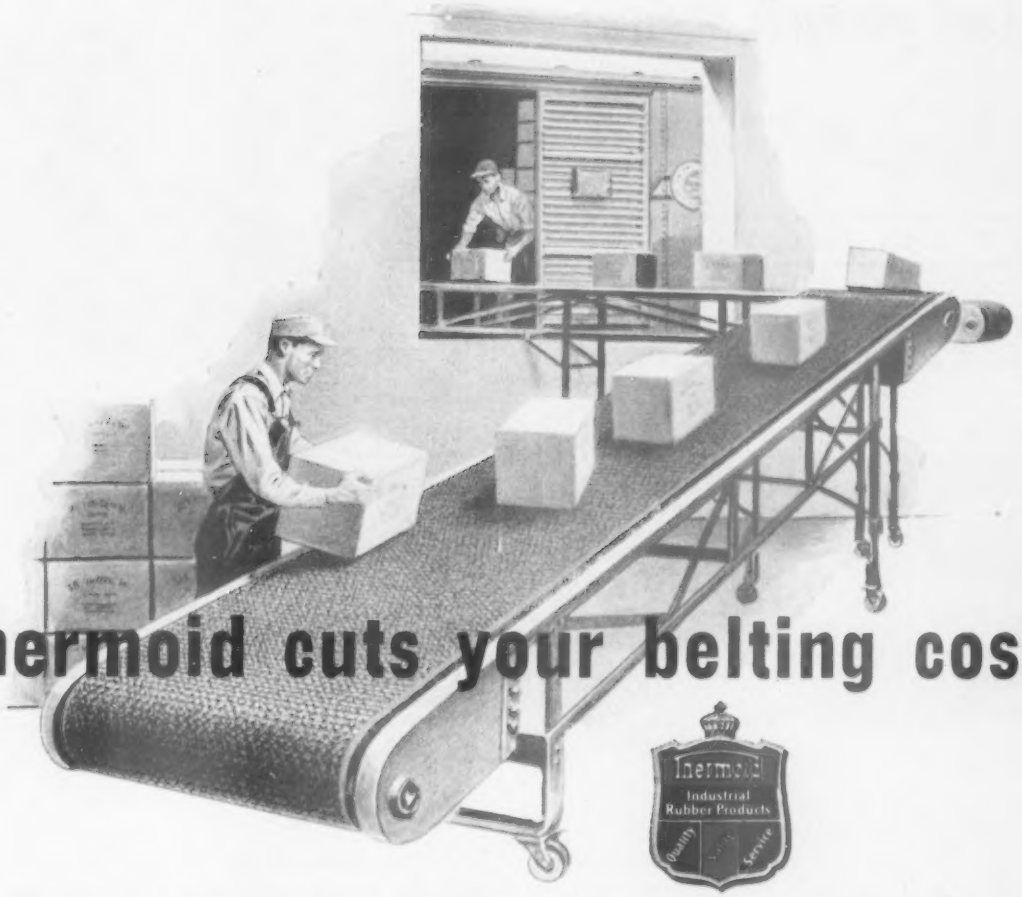
ELECTRIC MOTORS · TRANSFORMERS · INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS – AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

153-1



Thermoid cuts your belting costs

Regardless of the materials or products you handle, there's a Thermoid Conveyor Belt that will stay on the job longer . . . reduce down time.

The complete Thermoid line includes both standard belts for handling a wide variety of materials, and special types to meet specific requirements. Thermoid's special impregnation process welds carcass and cover into an exceptionally strong, durable belt.

Your Thermoid Distributor can select the belt best suited to your needs. If your problem is unusual, he'll call an experienced Thermoid Sales Engineer.

If you prefer, write direct for Thermoid Conveyor Belting Catalog #3679, containing full engineering data.

HT	A	C	NEOPRENE	CANNERS	HH	THERMOGLAS	RUFF TOP
For extreme abrasives such as quartz, granite, flint rock.	For lesser abrasives such as cement, ashes, etc.	For wood chips, gravel, etc. Ideal for portable conveyors.	Oilproof. Resists abrasion and high heat.	For handling fruit, vegetables. Acid resistant. Imparts no odor.	For high heat conditions other than oil. Temperatures to 250° F.	Specially treated glass fabric carcass. Withstands temperatures to 350° F.	Eliminates backslip of smooth articles on inclines to 35°.

Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

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Rubber Sheet Packings • Molded Products
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Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

Protect yourself against

1 HIGH REPLACEMENT COSTS

2 HIGH LIGHT COSTS

3 HIGH MAINTENANCE COSTS

CBM CERTIFIED by ETL

Here's why the initials "CBM" on a Fluorescent Ballast are important to you

Q. What do the initials "CBM" stand for?

A. "CBM" stands for CERTIFIED BALLAST MANUFACTURERS. Nine of the country's leading manufacturers of fluorescent ballasts comprise the CBM group.

Q. What does "CERTIFIED" mean?

A. It means that ballasts carrying this diamond-shaped shield have been built to rigid specifications designated by CERTIFIED BALLAST MANUFACTURERS. It means that Electrical Testing Laboratories, Inc., has periodically tested these ballasts and found they meet or exceed the exact specifications designated by CBM.

Q. What's the need for specifications?

A. Ballasts are the heart of fluorescent lighting. CBM specifications make certain the ballasts provide best possible performance for the lamps they operate.

Q. How do CERTIFIED BALLASTS benefit you?

A. When fluorescent lamps do not perform in accordance with published ratings, low quality or improperly designed ballasts may be the cause. However, most lamp manufacturers waive this possibility if the ballasts involved are CERTIFIED.

The CBM Shield is their assurance that the ballast is delivering proper electrical values to their fluorescent lamps.

CBM specifications protect the public interest because they provide:

FULL LAMP LIFE — **RATED LIGHT OUTPUT**
LONG BALLAST LIFE — **FREEDOM FROM OVERHEATING**
QUIET, TROUBLE-FREE OPERATION

Write for complete information on the types of CERTIFIED CBM BALLASTS available from each participating manufacturer.

Participation in the CERTIFIED CBM BALLAST program is open to any manufacturer who complies with the requirements of CERTIFIED BALLAST MANUFACTURERS.

CERTIFIED BALLAST MANUFACTURERS

Makers of Certified Ballasts for Fluorescent Lighting

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Of particular interest to research men are the *ElectroniK* Function Plotter, Duplex Recorder, Adjustable Span Recorder, ½-Second Pen Speed Recorder, and Extended Range Indicator. These instruments, and the wide line of standard *ElectroniK* indicators, recorders and controllers, can substantially accelerate your research. Your Research Director will appreciate the significance of these instruments; and your local Honeywell engineering representative . . . as near as your phone . . . will be glad to discuss specific applications.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, 4461 Wayne Avenue, Philadelphia 44, Pa.

REFERENCE DATA: Write for new Bulletin 14-1, "Automatic Instrumentation to Accelerate Research."

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls

THIS IS THE WAY
THEY USED TO DO IT . . .
using manual starters, taking electrician's time to start and properly synchronize the 440-volt synchronous motors.

NOW . . .

EC&M PUSH BUTTON STARTERS Synchronize Motors *Automatically* . . . Save Time . . . Do the Job *Better.*

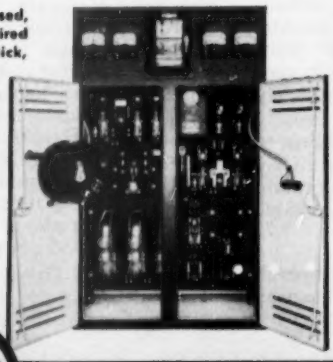
No false starts now. Push Button and Clutch Control Panel alongside each motor out in the mill.

The change-over to push button operation in this plant is typical of what is taking place in this push button age. The savings, safety, and greater efficiency of push button operation account for its increasing popularity.

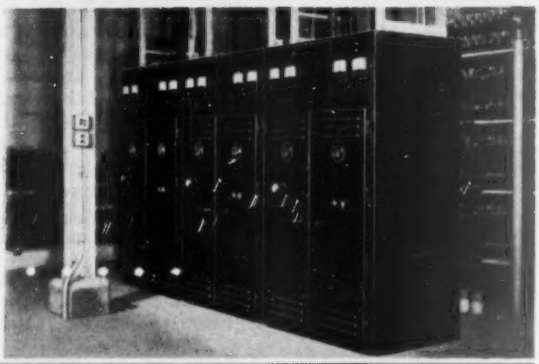
As the motor approaches synchronous speed, Field Control is *automatic* by the Polarized Field-Frequency Method. Excitation of the field occurs at a point most favorable to locking the motor into synchronism. *Field removal* and *re-application* occur automatically should a voltage dip or overload momentarily cause the motor to pull out of step.

We build Synchronous Starters for all low voltages and for 2300-4600 volt power systems. Bulletins 1076-7 and 8 and No. 21 ACCELERATOR Bulletin illustrate and describe these EC&M Starters, and how they save time in getting synchronous motors on the line under full protection. May we send you copies?

Totally enclosed, completely wired units . . . quick, low-cost installation. No expensive control room.



Group of 3 Reduced Voltage Resistor-type Starters for Ohio cement plant. Three other starters are similarly grouped on overhead balcony in the control room.



THE ELECTRIC CONTROLLER & MFG. CO.
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Quality
CANNOT BE ARGUED INTO A GEAR!
"ILLINOIS GEAR" BUILDS IT IN . . .
A gear is right or a gear is wrong. There will be no argument—
there will be no compromise with quality
when you specify Illinois Gears.
ILLINOIS GEARS
Gears for Every Purpose ... one gear or 10,000 or more
ILLINOIS GEAR & MACHINE COMPANY

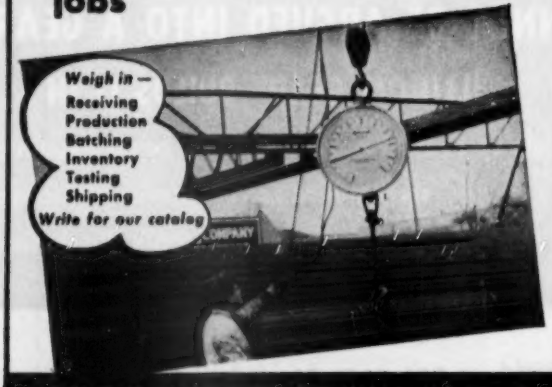
How much do you weigh?

Not you, but your products! Do you weigh in receiving, at production stages, etc. to protect your operation against overcharges, losses, miscalculations? HYDROSCALE, the hydraulic crane scale, makes it practical to check whenever and wherever you should, weighs on the spot, eliminates weighing stations and man power and equipment tie-ups.

36 MODELS, 500 to 200,000 LBS.

HYDROSCALE

reduces the effort and expense associated with routine weighing jobs



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drills 6 inches of concrete per minute

...gives lowest cost per foot of concrete drilled with a

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Drill straight, clean, ready to use holes at speeds up to 6 inches per minute—even through steel reinforced concrete. TILDEN Rotary Koncrete Kore Drills can be used with ordinary electric or rotary air drill. Free Factory sharpening and repair service still available on all Standard TILDEN Drills from 3/16" to 8-inch diameters. Interchangeable shanks for any depth hole.

WRITE TODAY for free, illustrated catalog.

SOLD BY SUPPLY HOUSES EVERY-WHERE

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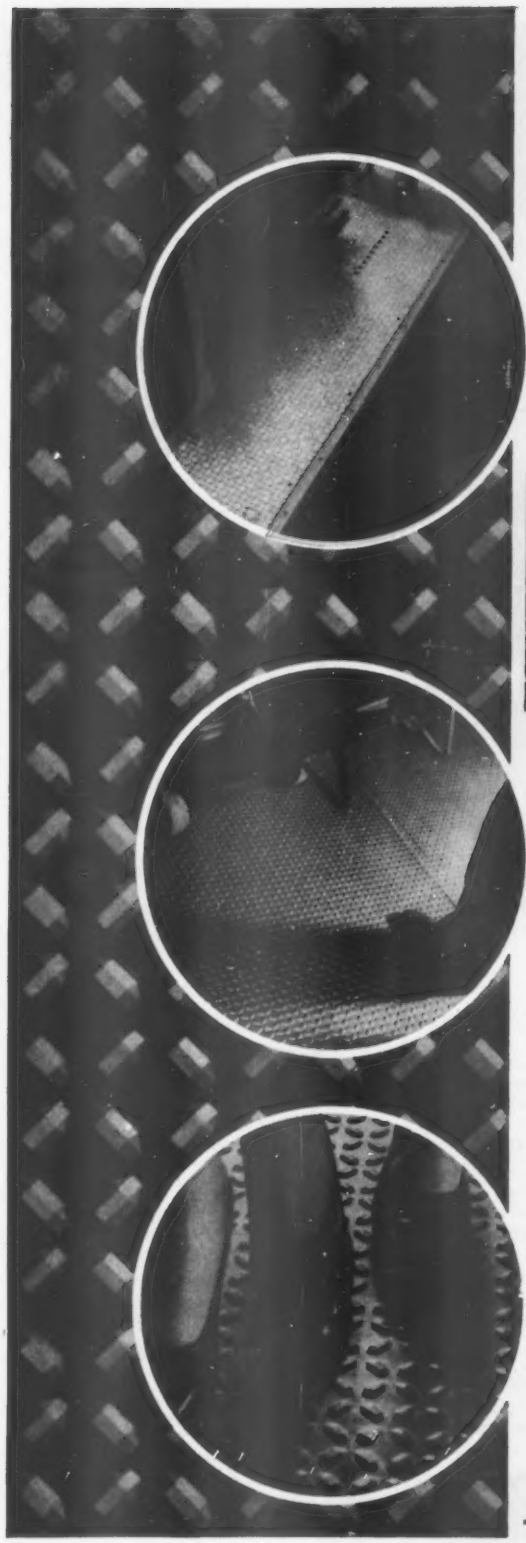
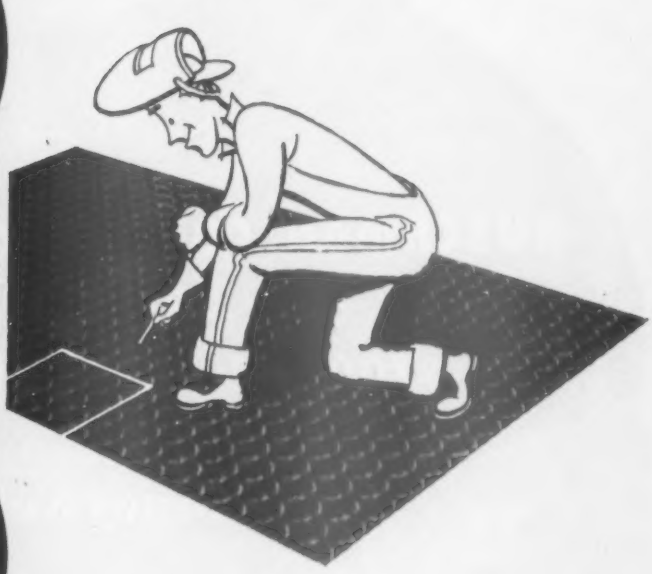


You can cut and join this floor plate to any shape you need,
And Multigrip will fabricate with utmost ease and speed;
For Multigrip is so designed to make the sections match
Placed end to end, or side to side, or in a side-end patch . . .
The pattern that is formed will be the same from all directions,
And Multigrip needs fewer joints for it comes in bigger sections!



EASY FABRICATION. The symmetrical pattern of U·S·S Multigrip Floor Plate allows neat, continuous installations and keeps cutting waste to a minimum. Available in long, wide sections, it reduces installation costs where large areas are to be covered.

Slip-proof Multigrip provides firm, sure footing for workers and positive traction for vehicles. The scientifically-designed risers feel comfortable underfoot . . . tend to lessen fatigue. The lozenge-shaped, evenly-spaced risers are at right angles to one another . . . form no pockets to catch dirt, grease and water, no gutters to trap vehicle wheels.

For entire factory floors or steps and platforms of machinery, for safety's sake use Multigrip, the non-skid, permanent floor plate.

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COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
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U·S·S multigrip

FLOOR PLATE

Sold by leading distributors from coast to coast

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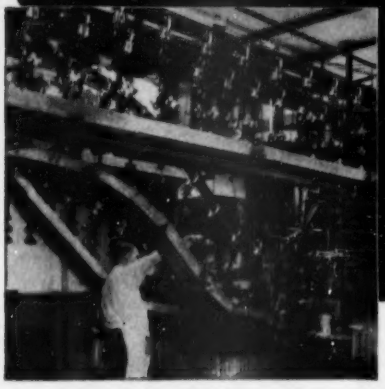
UNITED STATES STEEL

Vertical curve of Universal Cable Conveyor inclines to convenient work height, utilizes overhead space.

BUSCHMAN CONVEYOR costing only $3800.00 SAVES $7000.00 ANNUALLY at Honeywell



Conveyor carrier has three hooks. Placement of regulator valve on any hook indicates operations to be performed.

A BUSCHMAN OVERHEAD CABLE CONVEYOR SYSTEM replaces former manual handling method at MINNEAPOLIS-HONEYWELL REGULATOR CO. with resulting savings of $7000.00 annually on an investment of $3800.00. This does not include recovered floor space, reduced aisle traffic, easier working conditions and increased production.

It is anticipated that the overall total savings that will be realized by Minneapolis-Honeywell improved production methods in this instance is approximately $16,000.00 per year.

Smoother, reduced-handling operations on continuous flow, high production lines with comparable savings are being accomplished with BUSCHMAN Overhead Cable Conveyors in hundreds of plants in all industries. Why not investigate the possibilities of similar savings in your plant operations?

Write for NEW Bulletin No. 40

Representatives in Principal Cities

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Cincinnati 32, Ohio

Canadian Licensee: J. A. McKechnie Ltd., Toronto 13, Canada

PRODUCE MORE . . . FOR LESS on Buschman Conveyors

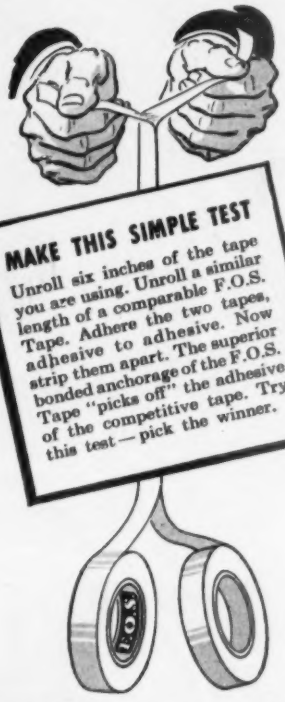
Eliminate

CLEAN-UP TIME BY AS MUCH AS 80%

WITH **F.O.S.** MASKING TAPE

"Transfer problem down" . . . "F.O.S. working out swell on our spray painting" . . . "Clean-up is down, production up, with F.O.S. on the job."

That's what they're saying about the new F.O.S. Masking Tapes with "anchored bonding," the strongest bond yet developed between adhesive and backing.


MAKE THIS SIMPLE TEST
Unroll six inches of the tape you are using. Unroll a similar length of a comparable F.O.S. Tape. Adhere the two tapes, adhesive to adhesive. Now strip them apart. The superior bonded anchorage of the F.O.S. Tape "picks off" the adhesive of the competitive tape. Try this test — pick the winner.
F.O.S.

Strong, tenacious, easy to apply F.O.S. Industrial Tape is made in widths, weights, constructions for every need.

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For production, assembly, packaging or shipping, you can save time and money with F.O.S. Industrial Tape. Ask an F.O.S. Tape Analyst to help you with specific tape problems.

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THE SEAMLESS RUBBER COMPANY
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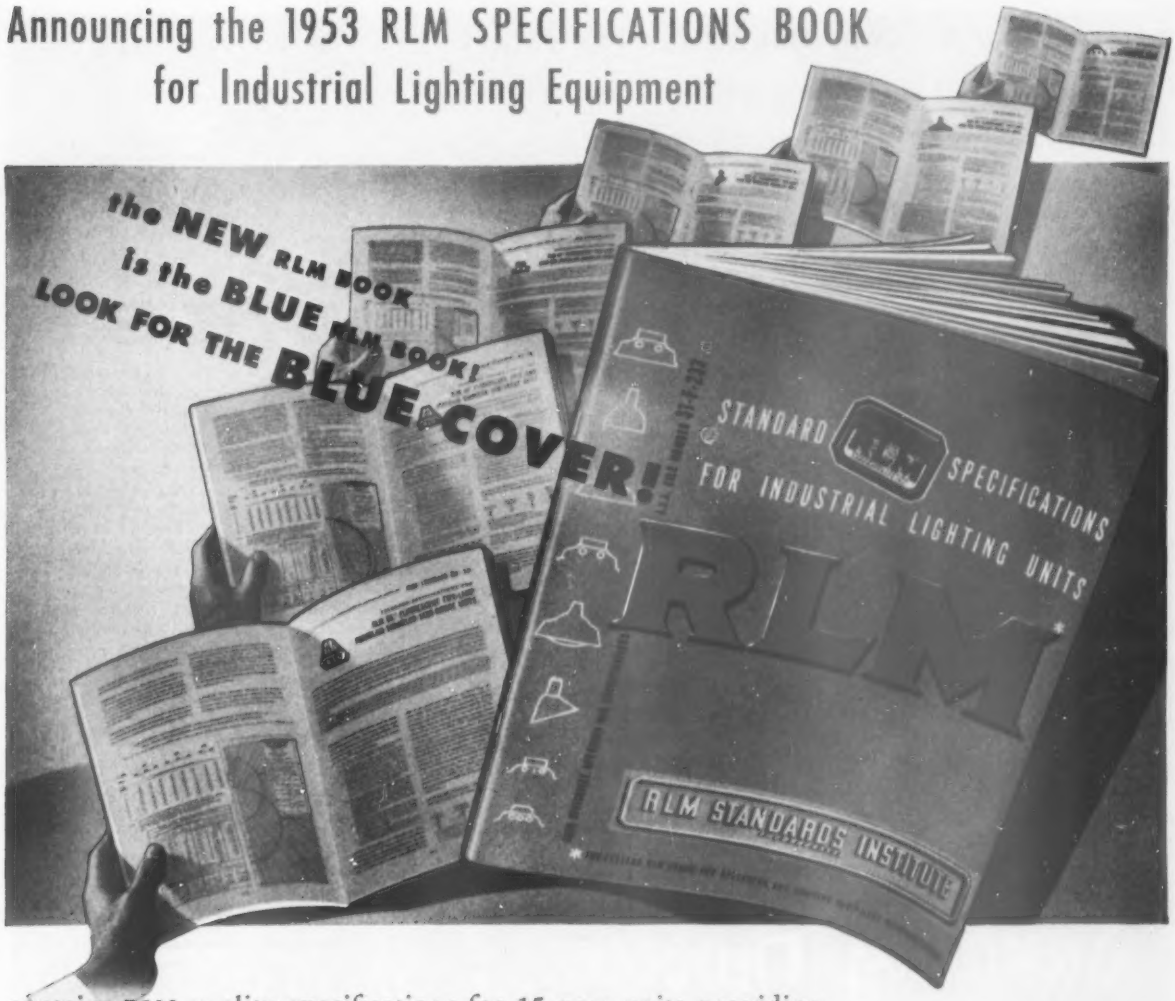
SEAMLESS

Announcing the 1953 RLM SPECIFICATIONS BOOK for Industrial Lighting Equipment


the NEW RLM BOOK
is the BLUE RLM BOOK!
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STANDARD SPECIFICATIONS FOR INDUSTRIAL LIGHTING UNITS
RLM
RLM STANDARDS INSTITUTE

contains RLM quality specifications for 15 new units providing
GREATER UPWARD LIGHT for even better industrial seeing conditions
plus IMPORTANT REVISIONS AND ADDITIONS to the other 68 RLM Specifications

Your copy of this newly-published reference book on industrial lighting equipment is ready now at no cost or obligation. Tens of thousands of architects, lighting engineers, electrical contractors, industrial executives and others have for 10 years relied on the RLM Specifications Book as an invaluable aid in measuring illumination, construction and performance standards, which are basic to lighting equipment efficiency, economy and ease of maintenance.

This new 1953 "blue-cover" edition is even more useful and valuable. It incorporates long-awaited specifications for 48", 72" and 96" RLM Semi-Direct Fluorescent Units. The new specifications cover 15 variations of this new "Upward Component" unit which directs from 20 to 30% of the light upward.

Altogether, this greatly-enlarged 1953 RLM Specifications Book has 52 pages, covering 83 different types and sizes of RLM-certified incandescent, fluorescent and mercury industrial lighting units. All specifications have been brought up-to-date in accordance with latest illuminating engineering developments.

Whether you buy, sell or specify industrial lighting equipment, you are invited to send for your FREE copy of the 1953 "blue-cover" edition of the RLM Specifications Book. Address request on your letterhead, please, to: RLM STANDARDS INSTITUTE, SUITE 829, 326 W. Madison Street, Chicago 6, Illinois.

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COMPLIANCE WITH RLM STANDARDS INSPECTED AND TESTED
ELECTRICAL TESTING LABORATORIES, INC.

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The letters RLM stand for Reflector and Lighting Equipment Manufacturers

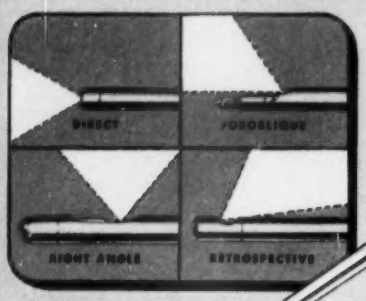
R391

INSPECTION OF CONFINED AREAS FACILITATED

NECESSITY OF DISMANTLING AVOIDED

TIME SAVED—MONEY SAVED

A.C.M.I. BORESCOPES..



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The A.C.M.I. Borescopes permit close-up visual examination of interior areas and surfaces not otherwise visible. They save time and money, and prevent costly dismantling, by providing a practical solution to a wide variety of inspection problems.

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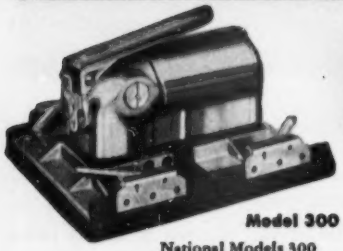
Each Borescope is a compact, self-illuminated industrial telescope of highest quality, employing a precision optical system, that produces a flat visual field. Lens systems are fully corrected for color, spherical aberrations, and coma, with all lens surfaces coated to increase light transmission.

Write for free informational folder, or tell us your problem.

American Cystoscope Makers, Inc.

1241 LAFAYETTE AVENUE NEW YORK 59, N. Y.

Sanding Problems?



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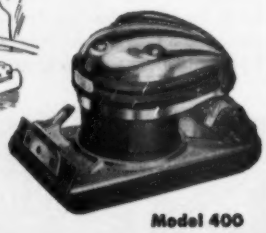
can speed production in your finishing room

National Models 300 and 300A are straight line action, reciprocating, two-pad, air sanders. Felt, rubber, and neoprene pads in different sizes and shapes are available for various types of surfaces and materials. Water attachment is built in for wet sanding.



Model 400

National Models 100 and 400 are orbital action, single pad, air sanders. Orbital action provides faster cutting and longer abrasive life. These lightweight, vibrationless, fast sanders can cut finishing time as much as 75% over hand sanding. See your dealer, or write for details.

NATIONAL NS SANDERS

NATIONAL AIR SANDER, INC.

2816 AUBURN STREET, ROCKFORD, ILLINOIS

CUSTOM-BUILT— NOT CUSTOM PRICED

Single and Polyphase

Fully enclosed Ball Bearings; semi-enclosed construction that protects against dripping and splashing hazards and assures cool, continuous operation. Available in polyphase—from ½ to 60 hp, single phase—from ½ to 5 hp, for wide adaptability of use and greater flexibility in your power planning.

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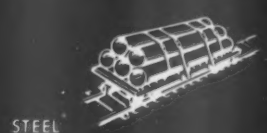

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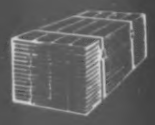
LUMBER MILLS



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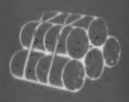
BUILDING MATERIALS

GRAIN DOORS FOR RAIL CARS



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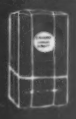

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Forty years ago, the Signode Strapping System was introduced to growing industry. Today, though there have been followers, Signode methods are still the accepted standard of the strapping industry. The reason is not merely the quality of the steel strapping we have made, but in the quality and dependability of the *methods* offered to industry to use steel strapping.

Today, steel strapping and Signode methods have become an integral part of the businesses shown above, and thousands more, because Signode has worked directly with industry to find the means to move more goods for faster — safer — better handling and arrivals. We are proud to have played a part in the growth of industry by giving shipments the strength of steel that is insuring safe deliveries all over America and the world.

John H. Leslie

PRESIDENT

SIGNODE STEEL STRAPPING COMPANY
2600 North Western Ave., Chicago, Ill.
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FAST BY-PASS

...to end traffic jams!

Old-fashioned intersections cause dangerous highway traffic jams! And, in a busy office or plant, using the "city" telephone system for both inside and outside calls creates costly delays, frequently loses important business! SELECT-O-PHONE gives you the fast by-pass around your regular telephone system—handles all interior communication, *automatically!* Keeps switchboards free—serves all stations . . . every station can call every other station at a flick of a dial. Speeds production—saves time, steps, money!

New! KELLOGG Select-O-Phone EXECUTIVE STATION

New SELECT-O-PHONE Executive Station brings a distinct note of efficiency to your desk. Carries your voice, delivers an answer with true-to-life clarity. Handsome walnut or mahogany cabinet . . . easily added to any SELECT-O-PHONE system.

Select-O-Phone
THE *Inside* VOICE OF BUSINESS

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SELECT-O-PHONE Division
Kellogg Switchboard and Supply Co., Dept. 12-I
***Sales Office:* 79 West Monroe St., Chicago 3, Ill.**

Please send me complete information on Kellogg *SELECT-O-PHONE* Systems and the new *Executive Station.*

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One DUO washes 4 hands

Maximum in Sanitary Cleanliness

- √ *No faucets* to touch or maintain
- √ No possible transmission of germs
- √ Clean running water from sprayhead
- √ No water waste, — foot pedal controls water flow — no chance of leaving water running unnecessarily
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Like the nationally used larger Bradley Washfountains, the DUO has gained wide acceptance for—

- public buildings
- factories and mills
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FOOT-CONTROL

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2215 W. Michigan Street
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BRADLEY Duo Washfountains

Distributed through Plumbing Wholesalers

Write for bulletin K-711.

Pure zinc or aluminum, molten-sprayed on iron or steel surfaces, provides complete, dependable protection against atmospheric corrosion for upwards of 20 years without further maintenance. Such coatings are *mechanically* bonded to the surface—adhesion is *not* dependent on volatile vehicles or binders. Scaling, crazing, blisters, are eliminated. Protection is positive. "Metallize 'em and forget 'em!"

Why not find out more about how you can forget rust for 20 years or more? For descriptive Bulletin 62B—or the name of your nearest Metco Systems contractor—write or wire.

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the Metco* Systems
—a series of 18 basic engineering specifications developed over 19 years of experience with pure zinc and aluminum coatings on many different types of structures and equipment. The *Metco Systems* provide for standardization of surface preparation, metal coating thicknesses and organic aftercoatings for various service conditions and appearance requirements.

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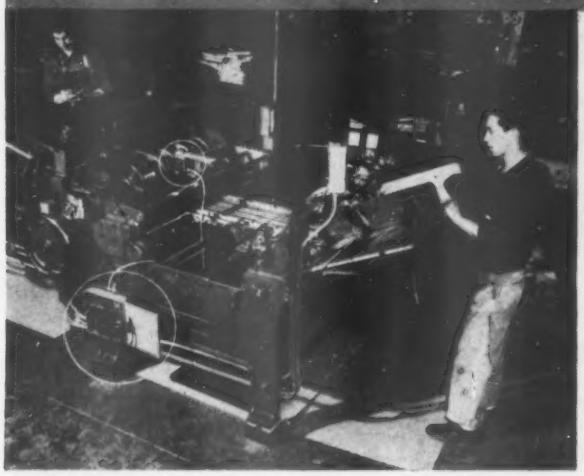
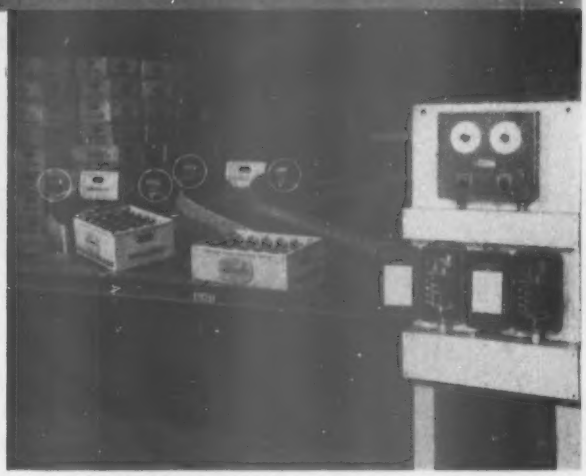
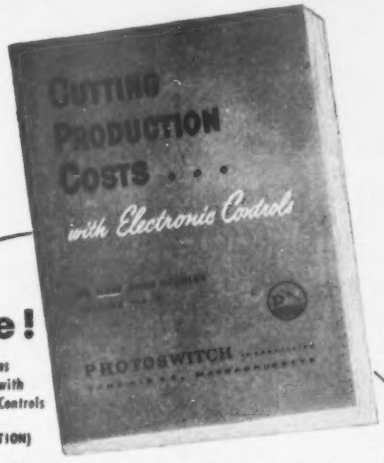
Your next step in control efficiency



No Goo or Spoilage — Photoelectric control on envelope machine makes certain envelope is properly positioned before permitting roller to make contact and apply glue.



What'll It Be, Gents? — remote control operator presets number of beer cases to move from each of three conveyors to delivery truck. Photoelectric controls dispatch and count them automatically.



Free!

Full of ideas for saving with Electronic Controls

(1953 EDITION)

A completely revised edition of the handbook that has become the "bible" of electronic control for thousands of engineers and production executives.

Newly edited, with 46 case studies showing how standard packaged electronic controls have solved many industrial problems you're likely to meet. It explains clearly and factually, without hocus-pocus, tested ideas for achieving new efficiency through "Electron-eered" counting, weighing, measuring, timing and cycling.

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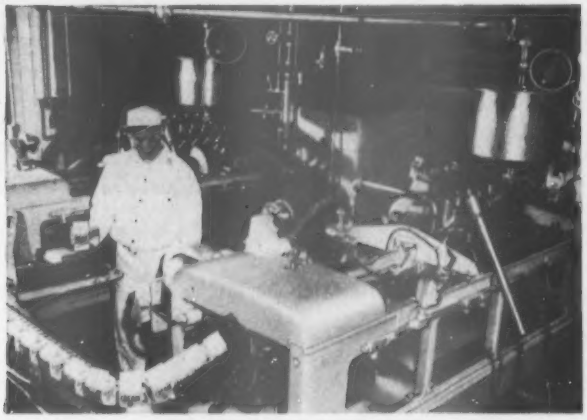

Perfect Level Control — This creamery's easy-to-clean, sanitary electronic level controls maintain exact levels — fill cream cartons precisely.

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Dept. FA9, 77 Broadway, Cambridge 42, Mass.

Send free, "Cutting Production Costs with Electronic Controls."

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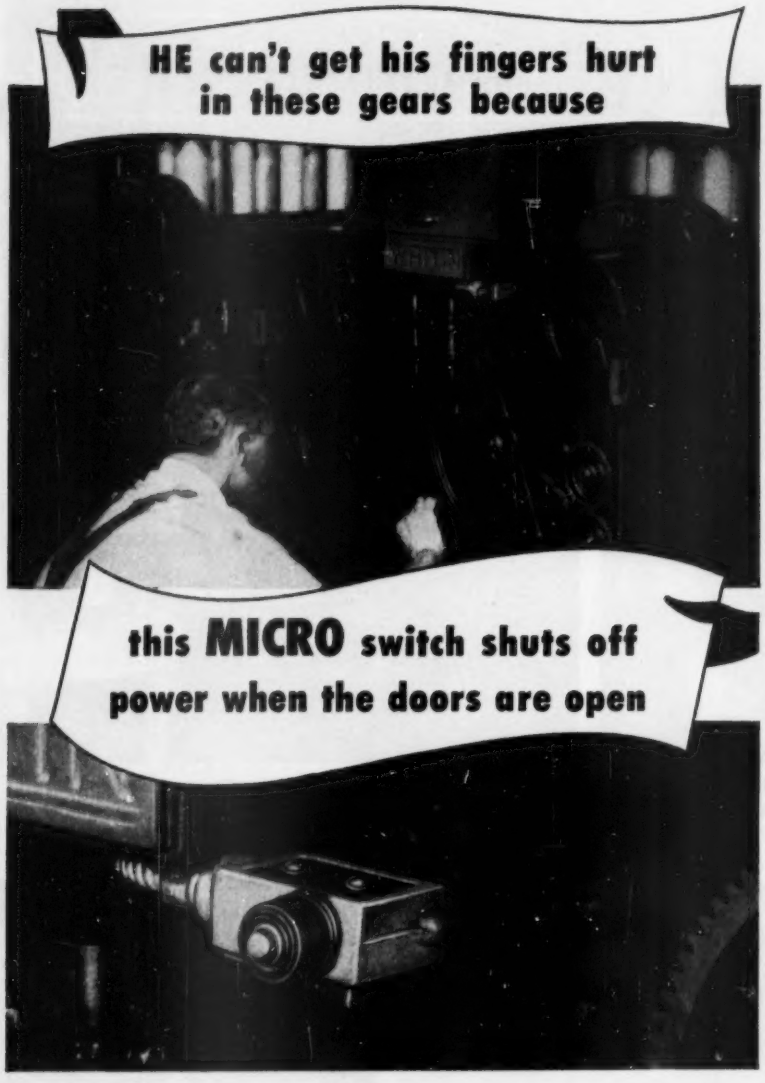

• Plant engineers of Borden Mills, Kingsport, Tenn., have added additional safety to 189 of their spinning frames in this way. They have found MICRO switches ideal because they are sealed against the effects of lint-laden atmosphere, are ruggedly housed and have sufficient overtravel to withstand the banging of heavy doors.

Such plugging of danger sources—both for operators and machines—with MICRO switches is common practice among plant engineers and maintenance men. They find in MICRO switches the most efficient and economical way to make equipment not only safer, but more automatic, more productive.

There's a MICRO authorized distributor near you with a wide variety of switches to meet specific needs. Look in your classified telephone directory under "Switches, Electric."

MICRO A DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR COMPANY
MAKERS OF PRECISION SWITCHES
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Don't be half safe — while you're at it, get complete protection. It could save you many thousands of dollars and countless hours of lost production. Plant protection is our business, so talk it over with Stewart. We produce many products designed for this purpose. For example: chain link wire and iron picket fence; wire window guards; wire mesh partitions; steel folding gates, and skylight guards. Also, all-steel settees, steel flagpoles, bronze plaques and other items. Stewart literature gives you the whole story. Write for it today.

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NEW and RELAYING RAILS
Depend on *FOSTER* to match sizes and specifications to meet all your requirements on any job—new installations or replacements.

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PACKS MORE POWER PER POUND

NEW Stanley "MIGHTY MIDGET"

Shown actual size

¼" Heavy-Duty ELECTRIC DRILL

Here is a fresh fist-full of power built for heavy-duty production drilling. It's the lightest, the most powerful ¼" drill ever . . . the new Stanley "MIGHTY MIDGET".

Compare this "MIGHTY MIDGET" with other ¼" drills before you buy . . . check point for point on the features you get for the money you pay. And remember you pay no "extras" for all the extra features offered by the new Stanley "MIGHTY MIDGET".

Send for catalog describing this and other cost-cutting Stanley Electric Tools or ask your distributor for a demonstration. He has them in stock . . . ready to go to work for you. Stanley Electric Tools, 407 Myrtle St., New Britain, Connecticut.

STANLEY

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COMPARE

—only the Stanley "MIGHTY MIDGET" offers all these features—

- Lightweight — only 3⅛ lbs. — most powerful drill of its size.
- Compact — 7⅛" long — easy to handle in close quarters.
- Balanced design — trigger-grip handle with auto-safety lock.
- Highly polished die-cast aluminum housing.
- Seal-type ball bearings, helical alloy steel gears.
- Removable chuck guard for better control, extra.
- Models in 6 different speeds — 5000, 3500, 2500, 2000, 1000, and 600 r.p.m.
- 3-jaw geared chuck, threaded in spindle.
- Brushes fully enclosed — protected from dirt and misuse.

HARDWARE • TOOLS • ELECTRIC TOOLS • STEEL STRAPPING • STEEL

When servicing costs are high as the lights...

LOWER BOTH LIGHTS AND COSTS WITH THOMPSON HANGERS

You're losing money when you use two men and a lift truck to service lighting fixtures . . . *and you're risking someone's neck!* **THOMPSON** disconnecting and lowering **HANGERS** facilitate rapid, safe, efficient floor-level maintenance of high-bay lights.

You can assure maximum round-the-clock lighting efficiency by following a planned maintenance program. And remember . . . *there is no faster, safer, or more economical means of servicing overhead lights than with THOMPSON HANGERS. Simple manual operation is exercised at floor level.*

1032 TE

Write today for new illustrated Bulletin TH52 for additional details.

THE THOMPSON ELECTRIC CO.

1121 POWER AVENUE • CLEVELAND 14, OHIO

6 Essential Facts

for a company with a Water Problem...

1. Costs Far Less to Install!
A Ranney Water Collector will add millions of gallons to your daily water supply—at a fraction of the cost of conventional systems!

2. Less Expensive to Operate!
A Ranney Water Collector is far less expensive to operate—uses fewer pumps, fewer personnel, less power, and usually requires no treatment facilities.

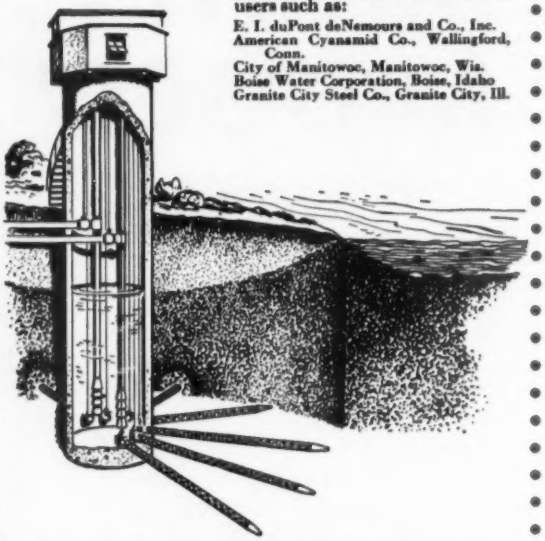
3. Maintenance Requirements Practically Nil!
A Ranney Water Collector requires little or no maintenance. The rate of flow through the Ranney Collector's apertures eliminates clogging and silting. No filter plant maintenance.

4. More Water per Unit!
A single Ranney Water Collector has produced more clear, cool water than ten conventional vertical wells.

5. Far Longer Life Cuts Depreciation Costs!
The longer life of a Ranney Water Collector lowers financing and depreciation rates appreciably.

6. Ask These Satisfied Users
Ranney Water Collectors are currently rendering excellent service to scores of large water users such as:

E. I. duPont deNemours and Co., Inc.
American Cyanamid Co., Wallingford, Conn.
City of Manitowoc, Manitowoc, Wis.
Boise Water Corporation, Boise, Idaho
Granite City Steel Co., Granite City, Ill.



An inexpensive Ranney survey will determine how the Ranney Method can work for you.

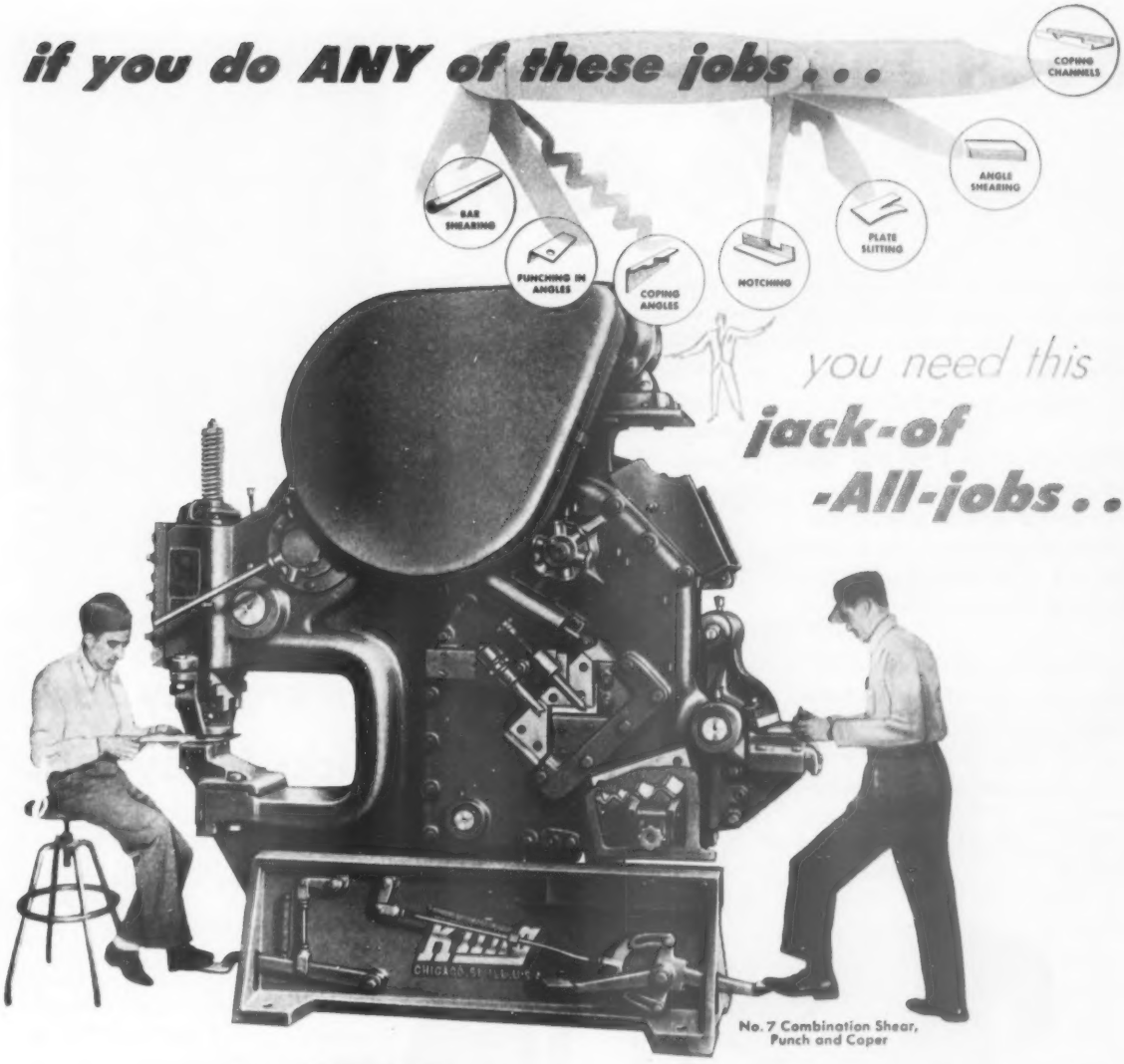
If you need water, write us for complete information on how a Ranney Water Collector will solve your problem.

Ranney Method Water Supplies, Inc.

HYDROLOGISTS AND WATER SUPPLY CONTRACTORS

Executive and Engineering Offices
Dept. O-9 P.O. Box 277, Columbus 9, Ohio

if you do ANY of these jobs . . .



No. 7 Combination Shear, Punch and Coper

the Kling COMBINATION SHEAR-PUNCH-COPER

Remember, when you were a boy, what a hit that 6- or 7-blade jack-knife made? You could do just about everything with it!

This Kling Combination Shear, Punch and Coper will make an equally big hit in your shop. It does any of the jobs shown above, and a lot more. It can turn out the same work as a separate punch, angle shear, bar shear, plate shear and notcher. Best of all, it costs only a few dollars more than a single-purpose punch.

To gain maximum speed and safety, each end operates independently. Foot pedals allow operators to keep hands free to hold work.

In shops of every size, the Kling Combination is speeding production, reducing man-hours, and increasing profits on metal-working jobs. Investigate what it can do for you. Available in 3 sizes, for light, medium and heavy work. Ruggedly built, and meets machine tool precision standards.

Write for latest FREE *Bulletin No. 347. Gives complete details of jobs this Machine can handle; also capacities, other technical data and specifications.*

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1325 North Kostner Avenue, Chicago, Illinois

Since 1892

Kling

...an investment in speed!

Friction Saws | Double Angle Shears | Rotary Shears | Punches | Plate Bending Rolls

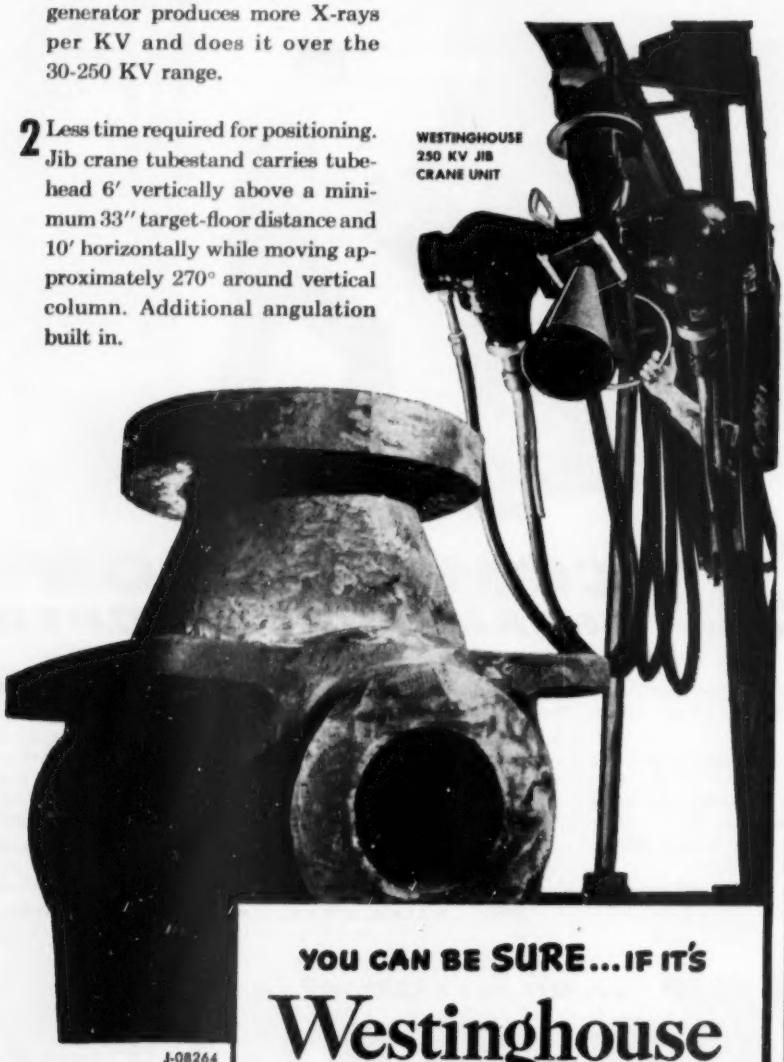
TOUGH JOBS *made easy*

At American Steel Foundries' plant in Newark, New Jersey, inspection of heavy steel castings is made easy by Westinghouse Industrial X-ray equipment. Reason: extreme *flexibility*.

1 Thick *or* thin materials take less time to radiograph. Westinghouse *Constant Potential* high voltage generator produces more X-rays per KV and does it over the 30-250 KV range.

2 Less time required for positioning. Jib crane tubestand carries tubehead 6′ vertically above a minimum 33″ target-floor distance and 10′ horizontally while moving approximately 270° around vertical column. Additional angulation built in.

Westinghouse assures you the finest, most flexible X-ray tools for your inspection jobs *plus* a coast-to-coast staff of technical experts. Call your Westinghouse X-ray representative or write Westinghouse Electric Corporation, 2519 Wilkens Avenue, Baltimore 3, Maryland.



WESTINGHOUSE 250 KV JIB CRANE UNIT

J-08264

YOU CAN BE SURE... IF IT'S

Westinghouse

(Advertisement)

EASY LIFTING at any point saves time. Jack has 13″ lift with minimum toe height of 2¼″; also tilts on base for lift or push at any angle.

4-Way Lift of Emergency Jack Licks Many Jobs

Full 15-ton lift capacity at all points extends Simplex Usefullness

Progressive plants cut costs on jacking jobs by using the extremely versatile Simplex No. 310A jack. It lifts its full 15-ton capacity on the cap; on the toe; on the cap shoe or at any intermediate point by using chain as sling. Pulling, pushing, skidding, lifting and lowering anywhere in the plant is done easily and safely. One jack handles many different types of jobs to cut equipment inventory and reduce costs.

This Emergency Jack is just one of the 165 different *SIMPLEX* JACKS for every conceivable jacking job. Others include Hydraulic, Screw and Ratchet Lever types in a complete range of Lifting heights and capacities. For a detailed guide to the *right* jack for *every job*, write for a copy of new *SIMPLEX* Catalog No. 53.

TEMPLETON, KENLY & CO.
2517 Gardner Rd., Broadview, Ill.

You can make high quality welds, quickly and easily, in stainless, aluminum, cast iron, HASTELLOY and MULTIMET alloys—practically all commercial metals—at lower cost with the 300 amp. HELIARC HW-10 water-cooled torch.

You'll find that the improved water-cooling system assures cooler and more effective operation even when the torch is used continuously at the full rated capacity. The cooling water flows through the power cable and torch body down to the water jacket and gas cup. The return flow follows the same route in reverse. All exterior "plumbing" has been eliminated allowing more maneuverability and preventing leakage due to accidental damage. Water-cooling makes lightweight torch construction possible, and because the power cable is also water-cooled, it too, is lightweight and easy to handle.

The HW-10 was designed so that the water passages are accessible and easily cleaned.

Electrodes are easily adjusted on the HW-10. A quarter turn of the torch cap releases the electrode for adjustment or replacement. You need no wrenches or other tools. In addition, electrode stub loss is reduced by placing the water-cooled electrode holder much closer to the arc.

Are you getting the best possible results from your present welding apparatus? Developments in the inert gas welding field have been so great and have come so rapidly that torches over four or five years old are now obsolete. Be sure that you have the highest production at the lowest cost. Modernize with the 300 amp. HELIARC welding torch.

Your local LINDE representative would be happy to give you more detailed information on the HELIARC HW-10.

"Heliarc," "Hastelloy," "Linde," and "Multimet" are registered trade-marks of Union Carbide and Carbon Corporation.

Linde
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A Division of Union Carbide and Carbon Corporation
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keep costs down

with accurate job time records

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FIGURES ELAPSED TIME ACCURATELY

PRINTS DATE
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TOTAL ELAPSED TIME

Keep production costs in line with automatically computed, precision Calculagraph job time records. Just stamp card at beginning and ending of the operation. Calculagraph prints date, starting and finishing time plus precision calculated elapsed time. One Calculagraph can record and compute job time data for one entire shop or department by handling any number of cards in any sequence. Accurate, printed Calculagraph records can be filed for future use in estimating on new orders and checking production efficiency. Calculagraphs are low in cost, practically maintenance-free and built for a lifetime of dependable service.

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Send complete data on Calculagraph to:

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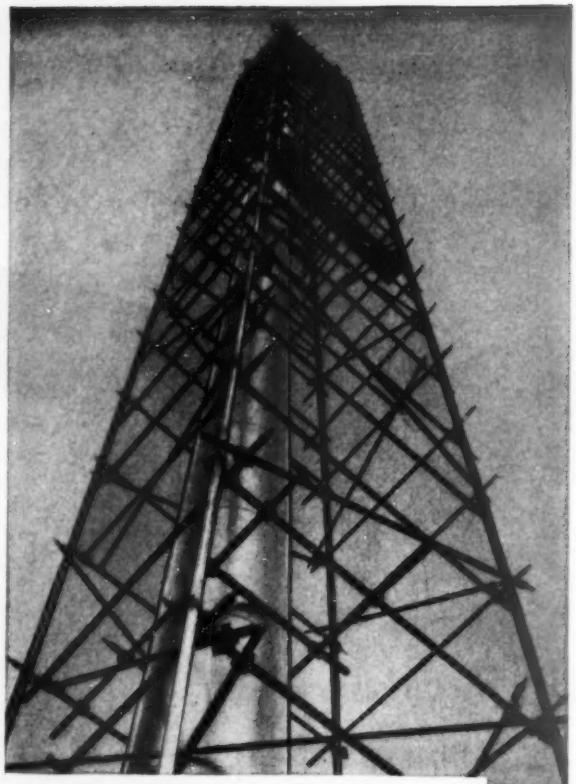


How To Keep Costs Down . . . When Maintenance Goes "Overhead"

When labor goes off the ground, costs and risks go up too!

Patent Scaffolding will save you time and money in all phases of off-the-ground maintenance — painting and cleaning; electrical work, machinery maintenance and many other jobs! Yes, and increase safety at the same time! . . . PS has exactly the *right* scaffolding to fit the job — *and the only complete scaffolding service!* It's worth remembering.

WRITE NOW FOR
FREE GUIDE to selection of the right equipment for any off-the-ground job. Just ask for Bulletin G205.

For Greater Safety... Efficiency... Economy

THE PATENT SCAFFOLDING CO. INC.

38-21 12th Street, Dept. FM&M, Long Island City 1, New York
West Coast Plant: 6931 Stanford Ave., Los Angeles, Cal. Offices in Principal Cities

MATERIALS-HANDLING NEWS

★ Panel Discussions by Bassick, World's Largest Manufacturer of Casters and Floor Protection Equipment ★

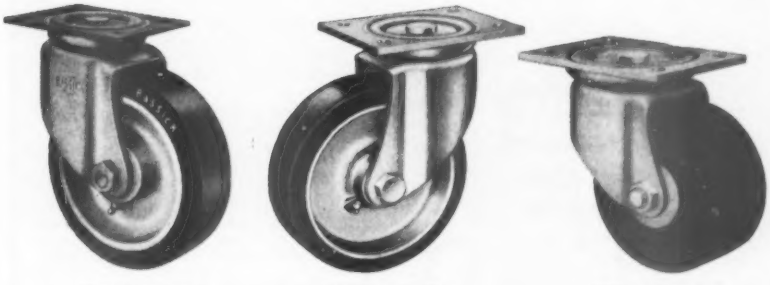
Are WALLFLOWER trucks costing you money?

If you're looking for ways to cut operating costs (and who isn't?), here's one that's often overlooked.

Check your rolling stock—dollies, hand trucks, portable equipment, etc.—and see whether you haven't got a few "wallflowers" that nobody wants to use. You'd be surprised how often equipment that seems to be in good shape stands on the sidelines because inefficient casters make them unpopular with workmen. Since they're hard to move, they get the cold shoulder in favor of equipment that rolls easily and smoothly. And it's no news that idle equipment wastes money fast.

You can make the "wallflowers" carry their full share of the load simply by equipping them with efficient Bassick casters. Why not try Bassick casters on one of your idle trucks? Then watch how quickly it goes to work for you.

Put them back in ACTION with these Bassick Casters



SERIES "L99" SERIES "H99" SERIES "S99"

These rugged Bassick truck casters make any floor an "Easy Street" for portable equipment. Built to give easier handling and longer life, they come in sizes from 3″ to 10″, with all types of wheels, have fully hardened raceways.

There's a Bassick industrial caster distributor in your neighborhood who stocks the right size and type of caster for anything from teatables to ten-ton trucks.

Why Roman roads are arrow-straight

Engineers who marvel at the enduring construction of the old Roman roads sometimes conclude that they're straight as an arrow because that's the best way to build military vehicular highways in a hurry. Some historians offer another explanation. They think these roads are straight because the Romans hadn't discovered the trick of swiveling the wheels of their 4-wheeled carts. Naturally these had a hard time getting around corners, while the famous Roman chariots simply skidded around on their two wheels.

This may also explain why the Romans built so many 2-wheeled state coaches when you'd expect them to have four wheels. An exception is the ornate carriage shown above, which is of uncertain date.

Good casters do not need straight roads. They provide the flexibility so important in materials handling to move any equipment immediately in any direction. Put your loads on Bassick Casters and save precious time and labor. Bassick has the right caster for the job.

THE BASSICK COMPANY
Bridgeport 2, Conn.

In Canada:
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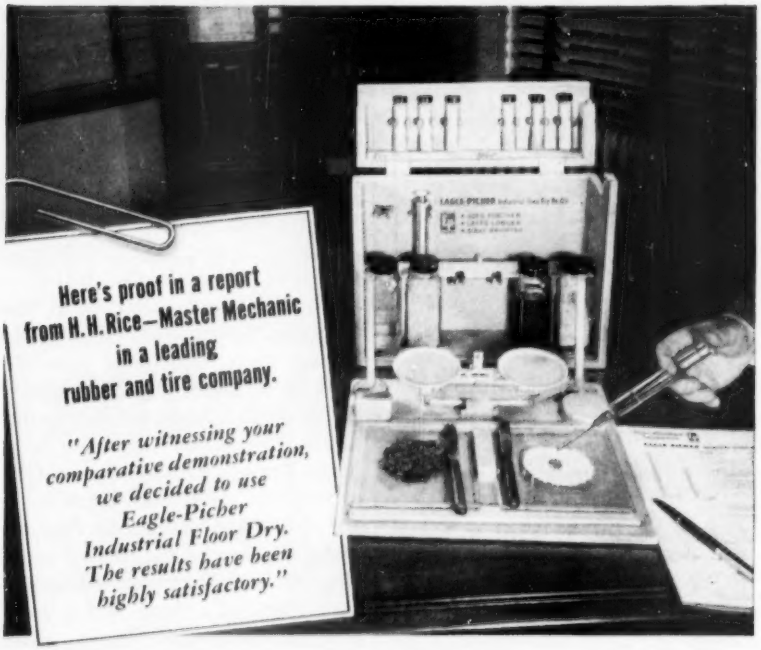
Bassick
A DIVISION OF STEWART WARNER SW
MAKING MORE KINDS OF CASTERS · MAKING CASTERS DO MORE

There's a big difference *in floor absorbents*

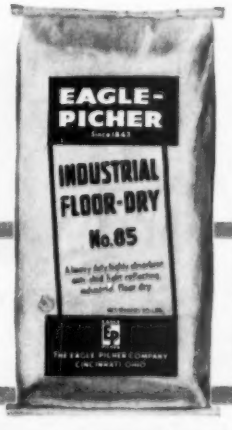

Here's proof in a report from H. H. Rice—Master Mechanic in a leading rubber and tire company.
"After witnessing your comparative demonstration, we decided to use Eagle-Picher Industrial Floor Dry. The results have been highly satisfactory."

You, too, can witness the difference in floor absorbents! With his portable laboratory, your Eagle-Picher man will analyze your floor absorbent *right in your office.* You may actually conduct the test yourself! Without obligation, of course.

Here's what the test shows—

- The amount of oil and water absorbed for given bulk.
- The cost of your absorbent in terms of absorption and coverage.
- The amount of coverage you're getting.
- The benefits of your absorbent in terms of safety and reflective ability.

You'll see that Eagle-Picher Floor-Dry is insoluble, chemically inert and non-combustible . . . that it combines light weight for exceptional coverage with light color for brighter, safer working areas. Write today for the full story.



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Either a Portable Unit to Clean Structures . . .

Pangborn Blast Cleaning Machine—Cleans tanks, bridges, buildings, and other structures quickly and economically. Ideal for maintenance and other jobs, such as removal of dirt, scale, rust, etc. preparatory to painting. Six sizes, stationary or portable, from . . . $188 and up.

Or a Compact Cabinet for Small Pieces

Pangborn Blast Cabinet—Saves time and money in cleaning small metal parts . . . removing rust, scale, grime, old paint, etc. Produces smooth, clean surfaces on pieces up to 60″ x 35″ in size. Models from . . . **$319** and up.

Pangborn Unit Dust Collectors—Trap dust at the source. Minimize maintenance, allow reclamation of valuable material . . . **$286** and up.

Pangborn Hydro-Finish Cabinets—Remove directional grinding lines, hold tolerances to .0001″. Reduce further finishing of tools, molds, dies . . . **$1410** and up.

Write for details on these machines to: PANGBORN CORPORATION, 2100 Pangborn Blvd., Hagerstown, Md.

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment.

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How would YOU control costs here?

1. FLINTKOTE INSULATED SIDING is saturated with hot asphalt by a continuous conveyor process through a dip tank. Fenwal THERMOSWITCH® Thermostats, connected to pilot lights, warn when asphalt varies from safe operating level. The totally enclosed mechanism of the THERMOSWITCH units is not affected by the high heat (420°F) or viscosity of the liquid.

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3. YOU, TOO, MAY BENEFIT from a Fenwal THERMOSWITCH Control.* Compact, highly resistant to shock and vibration, Fenwal THERMOSWITCH units are helping to cut costs and improve production throughout industry. The external, single-metal shell expands or contracts *instantly* to temperature changes, making or breaking electrical contacts.

*Cartridge Type Illustrated

4. SEND FOR THIS NEW CATALOG for complete explanation of the unique THERMOSWITCH unit. Also ask for more detailed, illustrated discussions of the problems above. Fenwal engineers will be glad to help you solve your temperature control problems involving heat, humidity, radiant heat, pressure and other variables. Write **Fenwal Incorporated, 69 Pleasant St., Ashland, Massachusetts.**

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Electric Temperature Control and Detection Devices

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2 Designing and developing a new product or redesigning an old product to give it greater sales appeal.

3 Tooling and equipping your plant for more efficient production at lower cost.

4 Training your men to properly use new tools and machines, thereby assuring better quality and more production.

5 Setting up a practical and efficient quality control system to maintain a high product acceptance.

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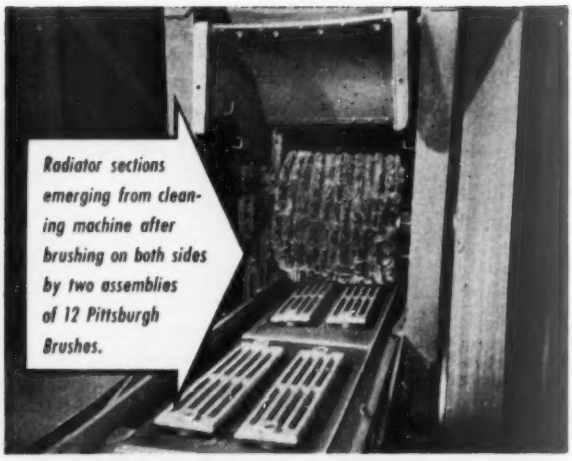

Radiator sections emerging from cleaning machine after brushing on both sides by two assemblies of 12 Pittsburgh Brushes.

Pittsburgh Brushes can help you solve problems like these!

Cleaning Narrow Spaces—National Radiator Company, Johnstown, Pa., cleans 30,000 radiator sections a week! To insure a perfect final finish, even the narrowest spaces must be absolutely clean prior to assembly. Pittsburgh engineers were asked to design a brush that would reach these spaces and would fit National's existing machine. Successful? National reports: "Pittsburgh Brushes do a better job of cleaning and are more economical."

Preparing Chills—At Continental Foundry & Machine Co., East Chicago, Indiana, chills used to cast iron rolls must be cleaned of the oxidized metal remaining from previous usage, as well as dirt and grease accumulated in storage. After experimenting with other brushes, Continental chose Pittsburgh because they "do the job better and stand up longer than any previously used."

Improving Original Equipment—The Sommer and Maca Glass Machinery Co., Chicago, Illinois, uses Pittsburgh Brushes in the automatic washing machines they manufacture. Brushes formerly used simply didn't have the over-all density pattern needed. Pittsburgh engineers studied the problem and designed a brush which Sommer and Maca approved "because of (its) denser bristle pattern and lower cost."

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Write today for a free copy of our booklet that shows, through actual case histories, how Pittsburgh cuts brushing costs. Address: PITTSBURGH PLATE GLASS COMPANY, *Brush Div.*, Dept. W-3, 3221 Frederick Ave., Baltimore 29, Maryland.

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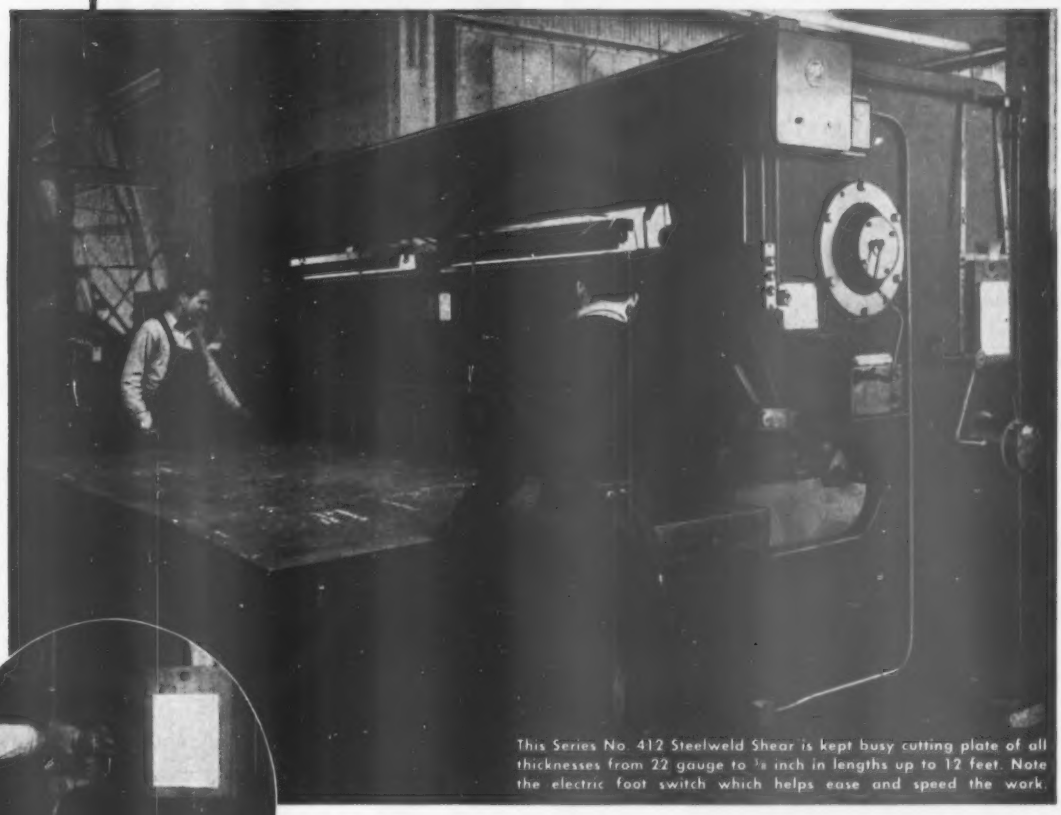
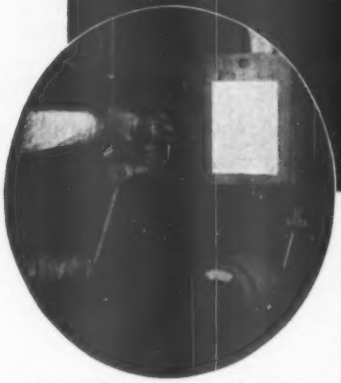
IN CANADA: CANADIAN PITTSBURGH INDUSTRIES LIMITED

KNIVES STAY SHARP LONGER for California Steelweld Shear User



This Series No. 412 Steelweld Shear is kept busy cutting plate of all thicknesses from 22 gauge to ½ inch in lengths up to 12 feet. Note the electric foot switch which helps ease and speed the work.



One of the big reasons why knives stay sharp longer on Steelweld Shears is the simplicity with which knife clearance can be adjusted for every plate thickness. It's merely a matter of turning a hand crank until the gauge pointer is on the proper figure. No bolts to loosen. No need of a feeler gauge.

"It's a shame," said the shop foreman at Stephens-Adamson Mfg. Co., Los Angeles, California, "but since installing our Steelweld Shear the knife-sharpening man has been crying because we have no work for him."

After months of continuous operation, eight hours a day, usually six days a week, inspection of cut pieces indicates the knives are practically as sharp as new. Parts cut have no burrs and are straight and true. Even when the cutting edges of the knives finally become dulled, there are three more cutting edges ready for use as all four corners of each knife are prepared for shearing.

Stephens-Adamson like their Steelweld Shear and are happy over its operation. It plays an important role in the manufacture of screens, elevators and conveyors which are the principal products of this large West-coast plant. In their words, it is "heavy, well built and dependable. We know it is reliable and always ready to handle our work from day to day."

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CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

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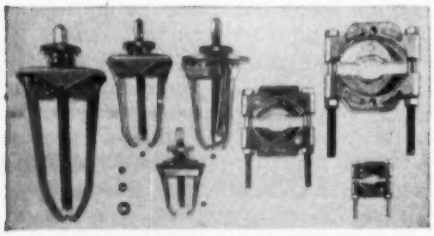

CG-608 Industrial Puller Set—Includes 4 screw-type pullers—small, medium (2-jaw and 3-jaw) and large. Size capacity up to 14", power to 20 tons. 3 Bearing Separators, up to 5¾" O.D. capacity, and Screw Point Protection Set.

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8½" Jaw Capacity 2-Jaw, Slide Hammer Gear Puller

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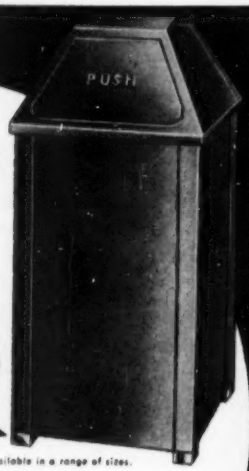
STAINLESS STEEL FEET



Available in a range of sizes.

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5. They're double-fold to dry double-quick.

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ScotTissue Towels have an exceptionally high fibre content. This "bulk," plus generous size and double fold, makes a case of 3,750 ScotTissue Towels weigh 46 lbs.* Some paper towels cost less for 3,750 but are 10 to 20 lbs. lighter* — hence less drying power. Write for more facts. Scott Paper Company, Dept. FM-1, Chester, Pa.

*Shipping weight

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Symbol of the right kind of washroom

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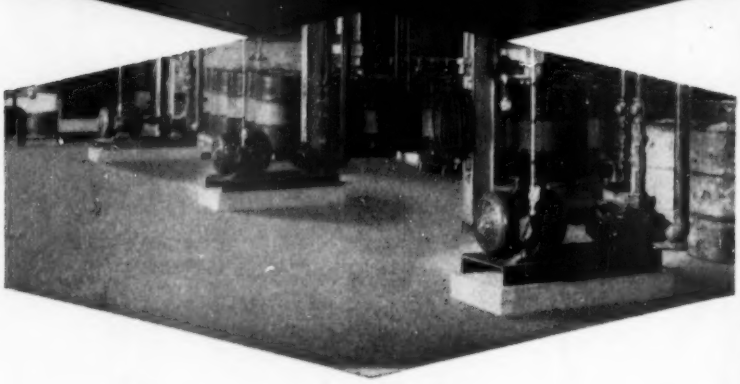
This time

GULF goes with ROPER



The Roper 3600...for General Purpose Pumping

This installation shows a battery of Roper 3600-MAHBRV Pumps in the Gulf Oil Corporation Packaging Plant at Charleston, S.C.

Widely recognized for dependability, these Ropers are designed to handle thick or thin liquids at slow speeds . . . are available in 40 to 300 G.P.M. sizes — pressures to 60 P.S.I. Self-lubrication, deep packing box, adjustable relief valve, hardened helical pumping gears, and high-lead bronze bearings are features that assure long service life; while quiet, smooth operation and high efficiency are performance qualities users appreciate.

Get full details from your Roper distributor, or send for our comprehensive catalog.

Close-up shows piping arrangement of one of the Series 3600 Pumps in the Gulf installation. Pumps were furnished with totally-enclosed anti-friction gear reduction and standard motor; the complete unit is mounted on steel bed plate.

ROPER *Rotary Pumps*

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Send for your free copies of "Work Done on the Blanchard", fourth edition, and "Art of Blanchard Surface Grinding".

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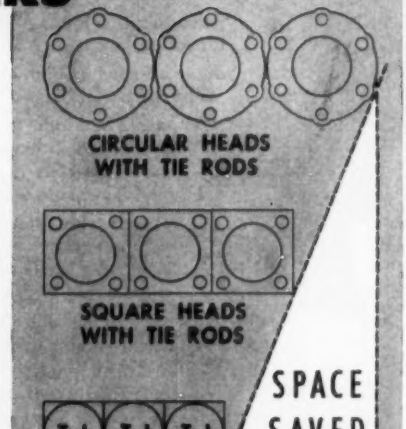

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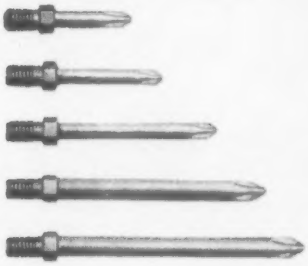
In short, you can get the answer to just about any screwdriving problem from Apex. Write, on your company letterhead please, for your copy of our new Catalog 21 — the authority on screwdriving.

to drive PHILLIPS or FREARSON screws

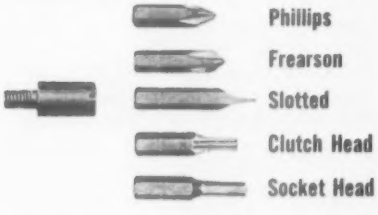


to drive SLOTTED screws

to drive CLUTCH HEAD screws

to drive HEX HEAD screws

...with APEX bit holder and insert bits



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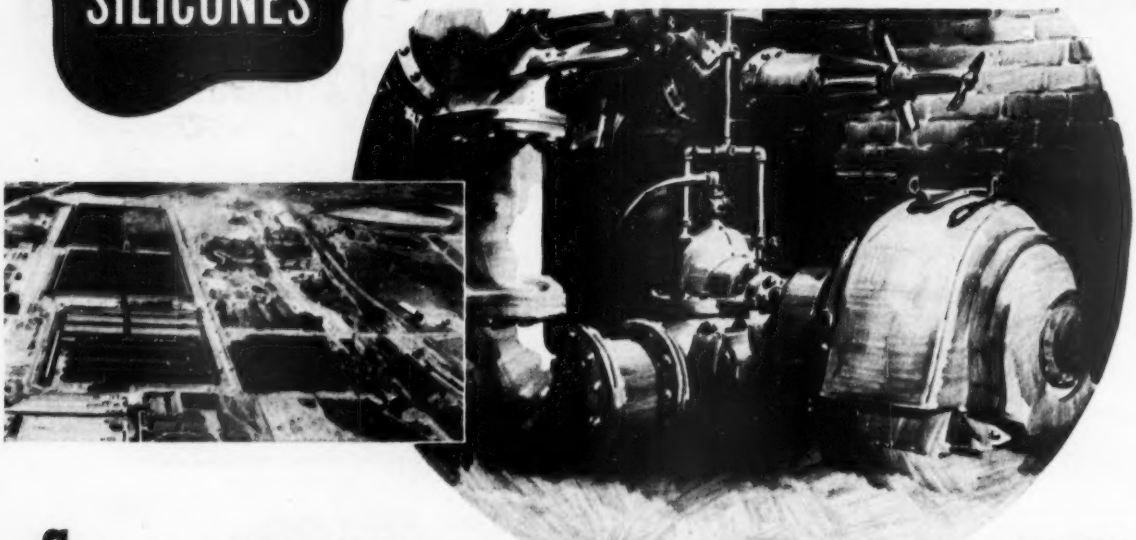
give motors more muscles



Seventeen 100 to 250 hp motors uprated by 50%; save over $50,000

Largest aluminum producing plant in the world, the Arvida Works of the Aluminum Company of Canada, Ltd., (Alcan) increased its capacity several times in the past few years to a current high of 2 million pounds of ingot per day. Over a year ago an obstacle to further expansion turned up in the ore plant, where bauxite is mixed with a caustic solution to separate the alumina. Called on to handle larger quantities of caustic solution, the plant was unable to replace their existing pump motors with larger motors. There was simply no room for them.

Alcan maintenance engineers neatly solved that problem by rewinding all 17 of their 100, 125 and 250 hp motors with Class H insulation made with Dow Corning silicones. Total power output was increased by more than 50%. The cost of rewinding with Class H materials was $50,000 less than the list price of the equivalent capacity in new motors. And that doesn't include the far greater expense of installing larger pedestals, changing all the fittings, and rearranging the pump lines to accommodate larger motors. Furthermore, downtime was held to a minimum during the changeover.

Rewound with Class H insulation these motors have carried a 50% overload for over a year in spite of frequent spraying with caustic solution. And that's typical of the performance of Class H motors, regardless of size. They can carry heavy sustained overloads; operate with greater power efficiency where periodic overloads are involved; give 10 or more times the life of Class B motors under comparable service conditions. That's why alert management, maintenance and production men now specify Class H insulation for hard-working motors, generators and transformers.

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Please send me:

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You can also reduce or eliminate motor outages due to bearing failure; specify Dow Corning 44 Silicone Grease for motor bearings.

In open and single shielded bearings designed for high temperature operation, Dow Corning 44 has 8 to 10 times the life expectancy of conventional greases. It gives life-time lubrication in permanently sealed bearings.

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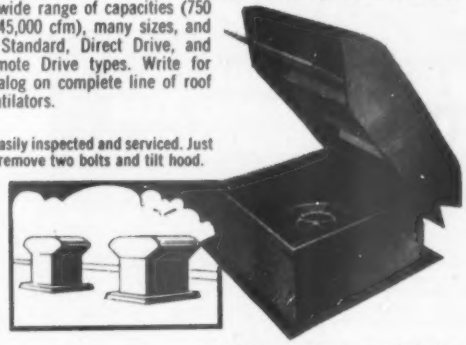

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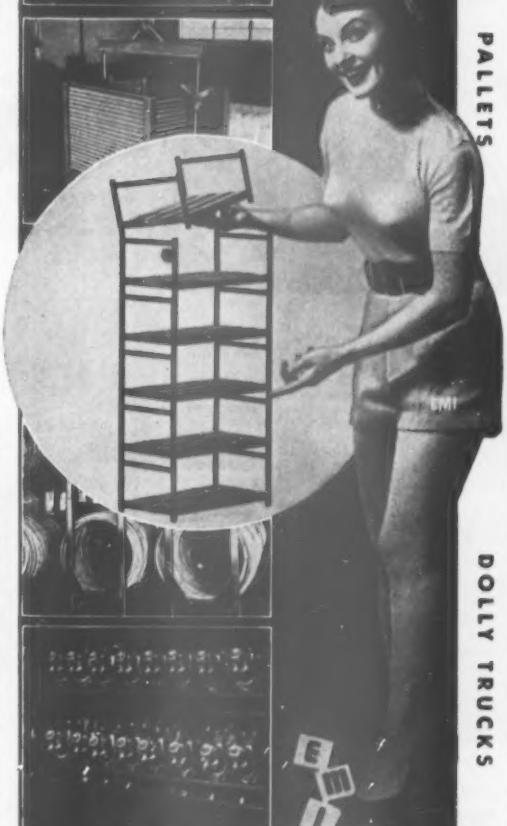

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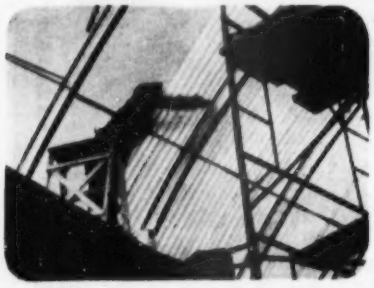

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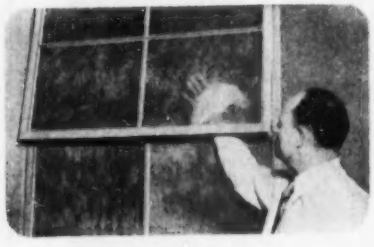

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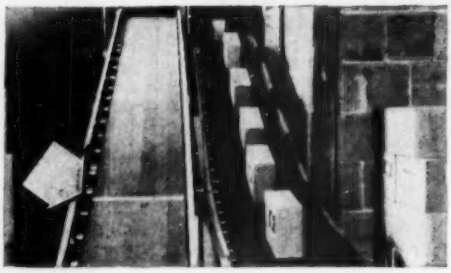

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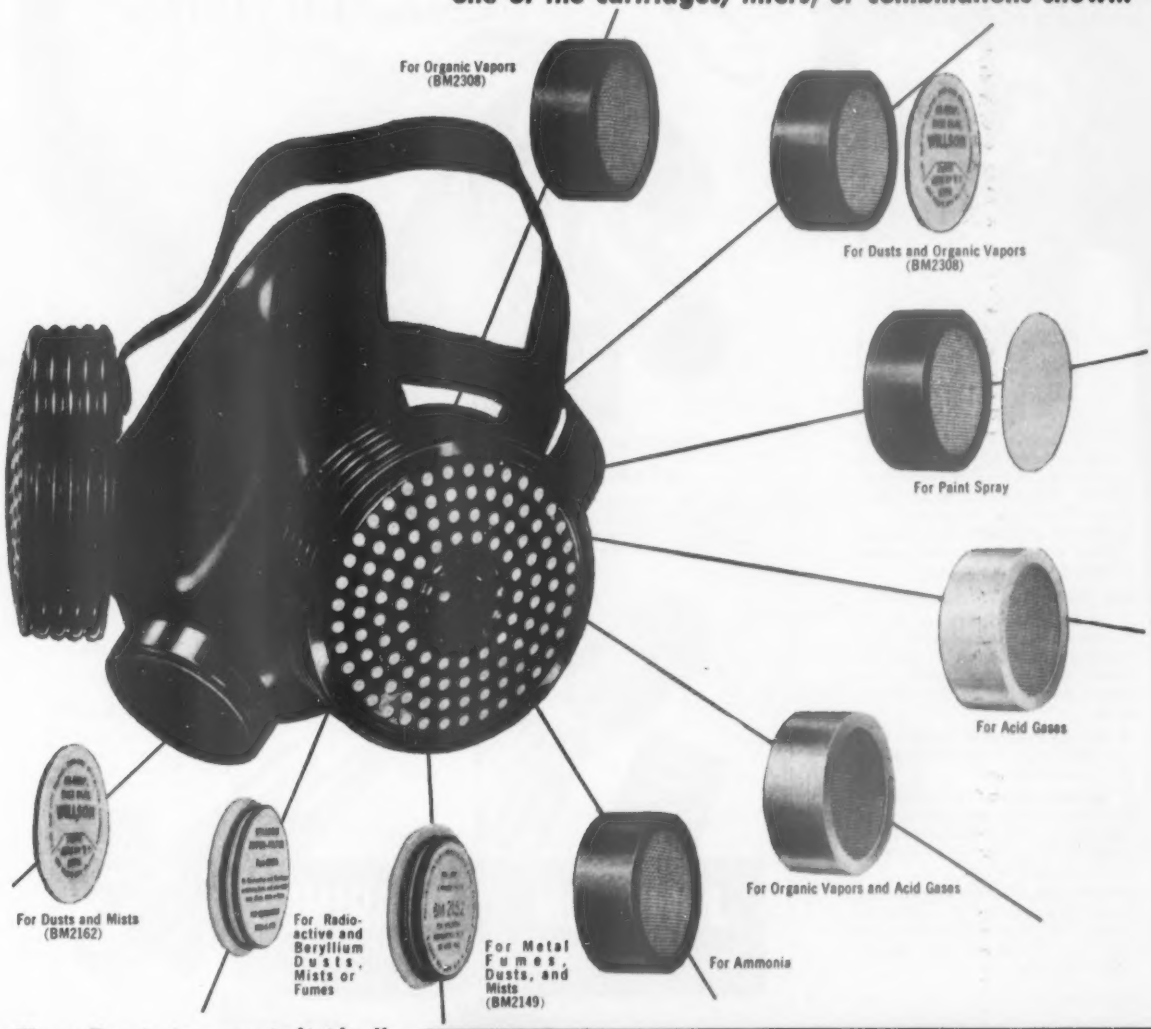
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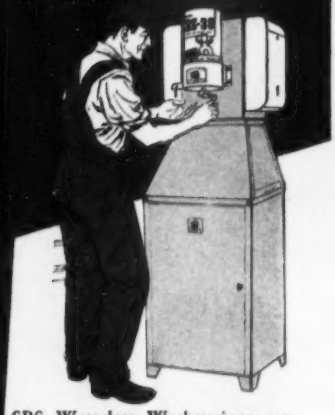

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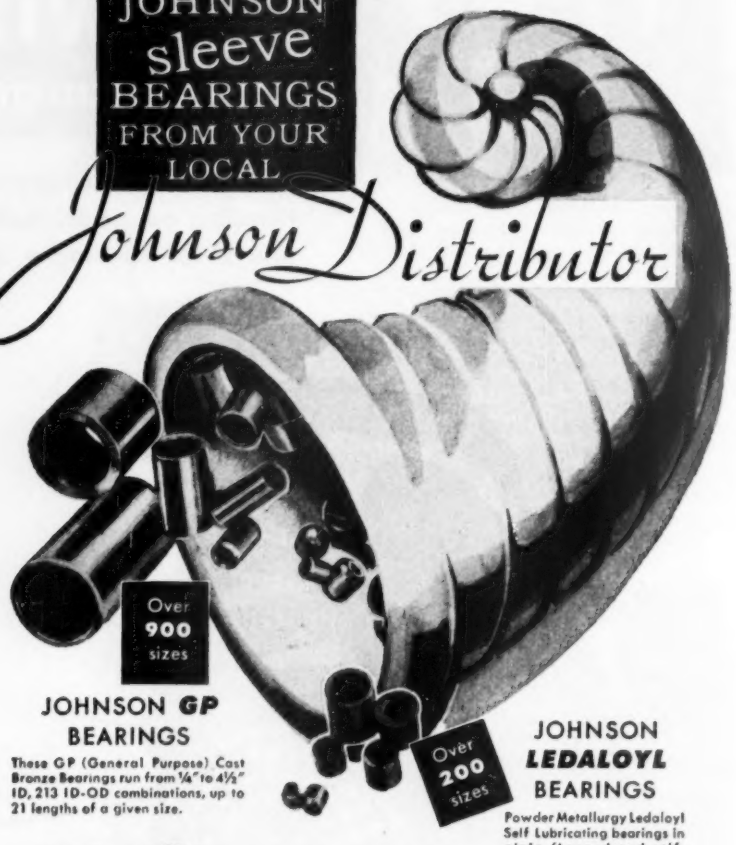

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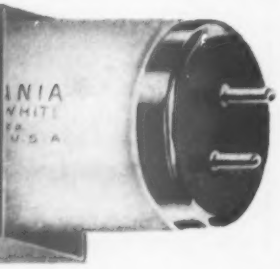

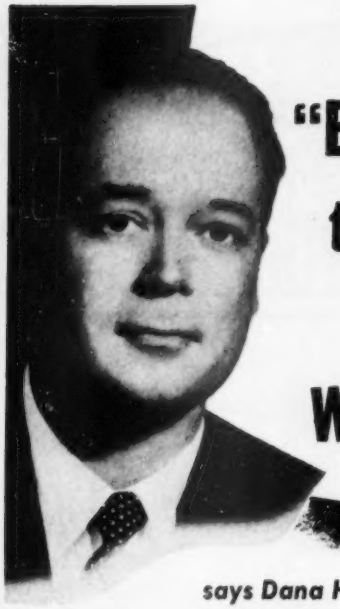

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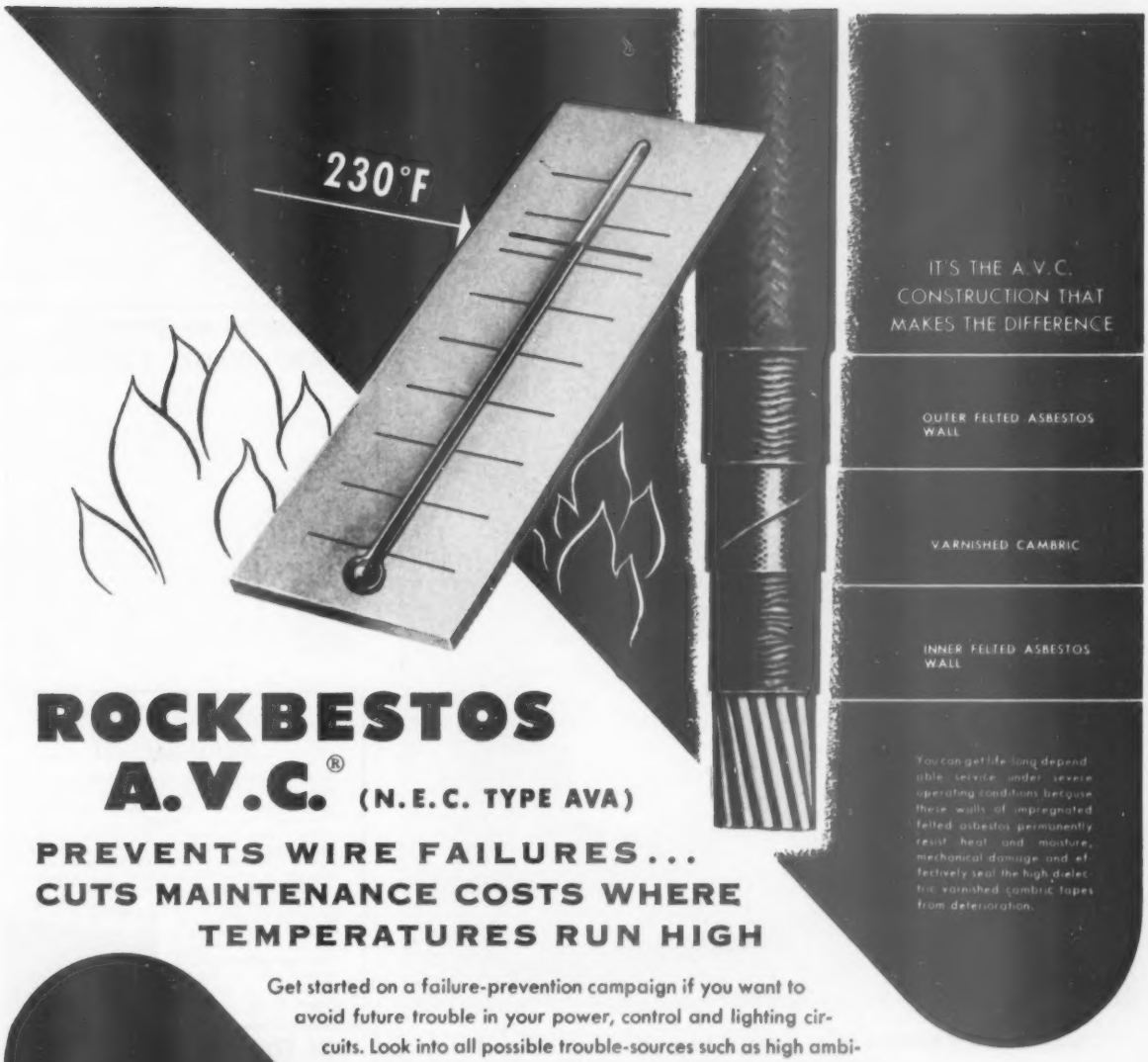
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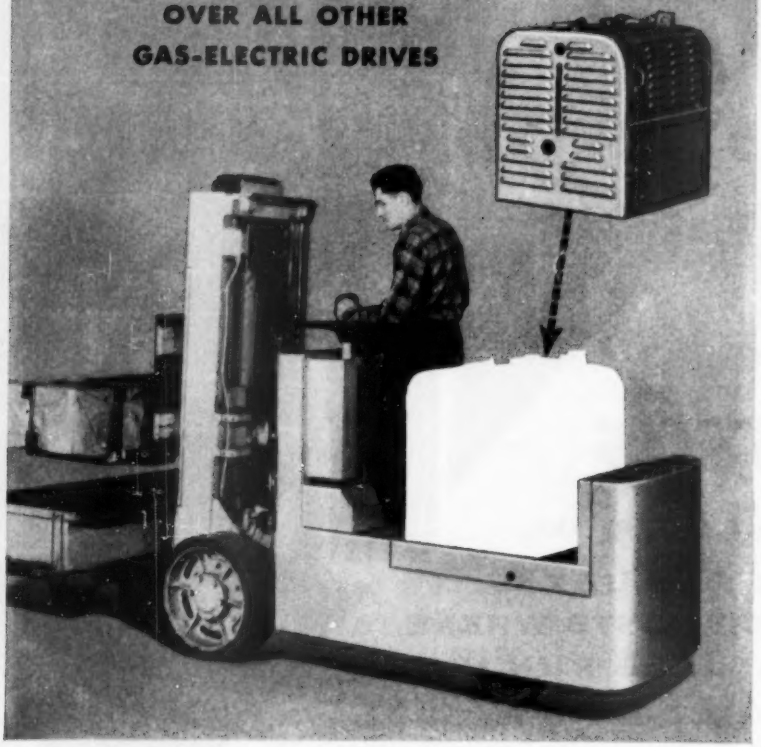

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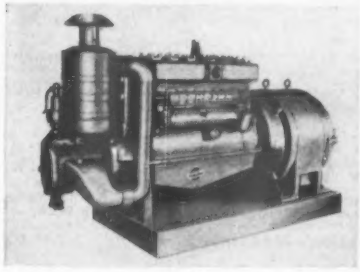
NEW SUPER-*Unistage* Air Compressor Offers Many Advantages

Schramm, Inc., makers of air compressors for 54 years, announces the newest in its line — a 600 c.f.m. industrial model, the Super-*Unistage*. Major advantage of this compact, vibrationless unit is its super-charge design, which puts it in a class all by itself and answers the industry's demand for such a model.



Noteworthy advantages are offered by the Super-*Unistage*. For here has been designed a large capacity compressor which at the same time is compact, vibrationless, adaptable to the unit-system installation whereby multiple power can be provided by operating the series of units, or a single or several units when peak air loads are not required.

Tailor-Made for Economy, Larger Air Capacity

Before purchasing any air compressor, it is quite natural to investigate its purchase price, maintenance, upkeep and installation costs. Here, in one package, you have the answer to your search for economy.

Its price is in keeping with the air it supplies . . . there is practically no installation cost since no elaborate foundation is required . . . and its maintenance is low.

Features

The Schramm Super-*Unistage* is a 150 h.p. six cylinder model having mechanically operated intake valves with the patented Schramm intake valve unloaders, large diameter cushioned low lift discharge valves, seven main bearing crankshaft with pressure lubrication to all bearings.

The unit is available with either an intercooler of a tubular type heat exchanger, with the water passing from the intercooler through the compressor jackets (as shown in illustration) or with the Schramm cooling unit, radiator type, in which the intercooler is an air-cooled unit with fan.

The model illustrated has 440 volt, 3 phase, 60 cycle, low starting current, normal torque, induction motor. Also, 208, 220 or 550 volt induction motors are available at the same price.

Other features make the unit notable.

SCHRAMM, INC., THE COMPRESSOR PEOPLE, WEST CHESTER, PENNA.

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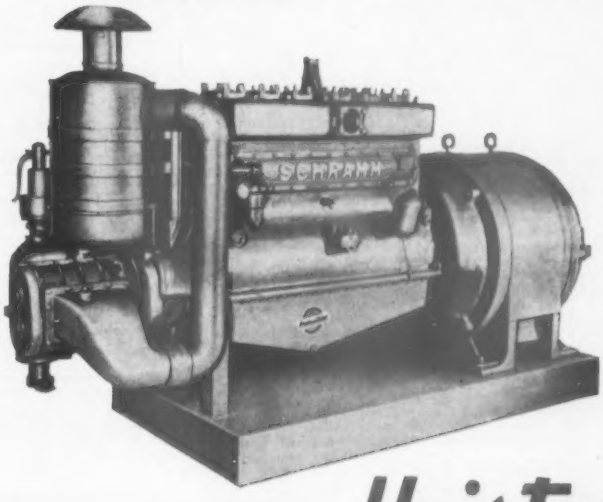

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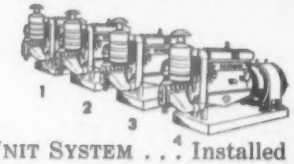
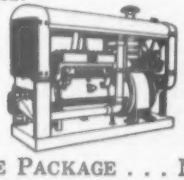
A Super-Charged 600 c.f.m. Air Compressor Designed to meet your Compressor needs for . . .

COMPACTNESS . . . requires less floor space than other models.

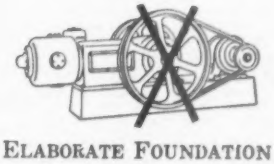


UNIT SYSTEM . . . Installed as a series, provides air as the air need varies.

VIBRATIONLESS . . . Perfect balance of all moving parts.



COMPLETE PACKAGE . . . No extras — everything one unit!



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AUTOMATIC SCREW MACHINES

½" cap. Cecо, Swiss type, 5-slide, 3 spindle drill att., 1943. Spiro Mach. Tool Co., 239 Centre St., New York, N. Y.

9/16" Davenport, 5 spindle. Aaron Machinery Co., 47 Crosby Street, New York 12, New York

1¼" Cap. Brown & Sharpe No. 2G (1). Also Nos. 0G (8) & 00G (5). Aaron Machinery Co., 47 Crosby Street, New York 12, New York.

1⅝" Cap. Cleveland Model AA, Model B18—1½" Cap., Model B. Aaron Machinery Co., 47 Crosby St., New York 12, New York.

1½" Cap. Conomatic, 4 spindle with collets, threading, tapping, etc. 1940. Spiro Mach. Tool Co., 239 Centre St., New York, N. Y.

BENDING ROLL

Bertsch 1⅜"x18' Pyramid type, 25" top & 19" bottom rolls, M.D., Late type. Botwinik Bros. of Mass., Inc., 7 Sherman Street, Worcester, Massachusetts.

BORING MILL, VERTICAL

24" Bullard, Spiral Drive, M.D., Late Type. Morey Machinery Co., Inc., Broome & Lafayette Sts., New York 13, New York.

NILES 42"-50" Side Head Boring Milling—Boring bar type head, dia. of boring bar 8¼". Botwinik Bros., Inc., Welton Pkwy., New Haven, Conn.

72" (Cap. 82") Italian Manufacturer, 2 heads on rail, plus 1 side head (Stock). Kings County Machinery Exchange, 408 Atlantic Ave., Brooklyn 17, New York.

72" Colburn Vert. Boring Mill. Samuel Machinery Co., 137 No. 3rd St., Philadelphia 6, Pa. Ma. 7-6100.

100" Niles, 2 swivel heads, 54" under tool holders, M.D. Botwinik Bros. of Mass., Inc., 7 Sherman St., Worcester, Massachusetts.

10' Betts, 2 hds., mtr. dr. Clarence J. O'Brien, 1032 Commercial Trust Bldg., Phila., Pa.

144" Niles MD, 2 heads. This machine excell. cond., taken out of operation. Botwinik Bros., Inc., Welton Parkway, New Haven, Conn.

BROACHES

Vert. Hyd. 12 ton American No. V50, pull type, late machine, taken out of operation. Botwinik Bros., Inc., Welton Parkway, New Haven, Conn. 5-54 Cincinnati 5 ton, M.D., Vert. Hydro-Duplex Broach. Botwinik Bros., Inc., Welton Pkwy., New Haven, Conn.

CHUCKING MACHINES

21" Potter & Johnson No. 4D, MD high speed excell. cond. Botwinik Bros., Inc., Welton Parkway, New Haven, Connecticut.

Bullard #16—23", 8 spindle, vertical mult-automatic. Botwinik Bros., Inc., Welton Pkwy., New Haven, Conn.

DRILLING MACHINES

Radial: 3' American 9" Rd. Column, Gear Box M.D. Delta Equip., 148 N. 3rd St., Phila.

Radial: 3' American, Enclosed head, Excellent Condition. Fitzpatrick and Walsh, 2439 N. 9th St., Phila. 33, Penna.

ENGRAVING MACHINES

Gorton Models—1D, ME, 3U, 3Z, Deckel type GK2, Taylor Hobsom 3 dim. Munex Engraver and Vert. Mill. Aaron Machinery Co., 47 Crosby St., N.Y.C.

GEAR MACHINES

10" Pratt & Whitney M.D., two wheel spur and helical Gear Grinder. Botwinik Bros., Inc., Welton Pkwy., New Haven, Conn.

Gould & Eberhardt 96"x30" Spur & Helical, Automatic, M.D. Botwinik Bros. of Mass., Inc., 7 Sherman Street, Worcester, Massachusetts.

Pfauter 118"x22" Spur, Helical, Worm & Herringbone, Automatic M.D. Botwinik Bros. of Mass., Inc., 7 Sherman St., Worcester, Massachusetts.

GEAR CUTTING MACHINES

Barber-Colman type S, No. 2, 12 Gear Cutters and Mod. S.H.S. sharpener. Aaron Machinery Co., 7 Crosby St., New York, New York.

#2 Gleason Hypoid Gear Generator Serial #27158, less than 200-hours use, new 1952, New York City Area. FS-8647, Factory Management & Maintenance.

#4 Gleason Angular Hand Tester, Serial #26541, less than 200 hours use, new 1952, New York City Area. FS-8649, Factory Management & Maintenance.

#7 Gleason Cutter Sharpener, Serial #36415, less than 200 hours use, new 1952, New York City Area. FS-8648, Factory Management & Maintenance.

#725 Fellows Gear Shaper, Serial #27935, less than 200 hours use, new 1952, New York City Area. FS-8648, Factory Management & Maintenance.

GRINDING MACHINES

Centerless: No. 4 Cinn. MD with thru-feed attach. Botwinik Bros., Inc., Welton Pkwy, New Haven, Conn.

Cylindrical: #2 Brown and Sharpe 14" x 36" Motor Drive, Bargain. Fitzpatrick and Walsh, 2439 N. 9th St., Phila. 33, Penna.

Cylindrical: 10" x 24" Landis, type C, Univ. Hyd. All-State Mach'y Corp., 183 Centre St., N.Y., N.Y.

Internal: #72A3 Heald, 1943, Equipped. Green Bros. of Worcester, 957 Southbridge St., Worcester, Mass.

12"x12"x24 Thompson Form Grinder—1951. Samuel Machinery Co., 137 No. 3rd St., Phila 6, Pa.

Surface: #2 Brown & Sharpe, 6"x18", new 1944. Tri Machine & Tool Co., 248 Lafayette St., NYC.

Surface: #2 Reid, 6" x 18" Capacity Magnetic Chuck Motor, New 1940. Fitzpatrick and Walsh, 2439 N. 9th St., Phila. 33, Penna.

Surface: No. 16A Blanchard MD, vert. dial loading. Botwinik Bros., Inc., Welton Parkway, New Haven, Conn.

Surface: Gallmeyer & Livingston Nos. 55 x 65 Hyd. with coolant. Aaron Machinery Co., 47 Crosby St., N. Y.

10" x 24" G & L Hyd. Sur. Grinder—1943. Samuel Machinery Co., 137 N. 3rd St., Phila 6, Pa.

Surface: 12" x 24" Thompson Hydraulic. All-State Machinery Corp., 183 Centre St., New York, N. Y.

14" x 60" Mattison Surface Grinder—Late. Samuel Machinery Co., 137 No. 3rd St., Phila. 6, Pa.

Thread: Jones & Lamson Mod. T.G.-615 with truing device, helix att. cpl. with motors. Aaron Machinery Co., 47 Crosby St., N. Y.

Tool & Cutter: No. 1 & No. 2 Norton chuck, motors and starter. Aaron Machy. Co., 47 Crosby St., NYC 12.

LATHES

9 x 22" Hendey Toolmakers Lathe. Samuel Machinery Co., 137 No. 3rd St., Philadelphia 6, Pa. Ma 7-6100.

12"x30" American, geared head with motor-in-base, coolant pump, 12"—4 jaw chuck, steady rest, collet attachment, collets. Aaron Machinery Co., 47 Crosby St., New York, N. Y.

12½" x 40" centers (2) New Rocco at cost Price $1750 ea. Kings County Machinery Exchange, 408 Atlantic Ave., B'klyn 17, N. Y.

16" x 60" centers New Troglia, Taper att. at cost price $3250. Kings County Machinery Exchange, 408 Atlantic Ave., B'klyn 17, N. Y.

20" x 54" center, Reed-Prentice, gr. hd. QC gear, 16 sp. Botwinik Bros., Inc., Welton Pkwy., New Haven, Conn.

20" x 14" bed Hendey, MD, gr. hd. eng. Botwinik Bros., Inc., Welton Pkwy., New Haven, Conn.

20" x 120" Centers Walcott, Quick Change, Motor Drive, Taper Attachment, Sacrifice price. Fitzpatrick and Walsh, 2439 N. 9th St., Phila. 33, Penna.

24" x 10' Bed Lodge & Shipley. 12 sp. select. hd. gr. eng. Botwinik Bros., Inc., Welton Pkwy., New Haven, Conn.

25" x 12' Sidney Quick Change, Motor Driven. Delta Equip. Co., 148 N. 3d St., Phila.

Heavy Duty: LeBlond, swing 25/50x96" centers, sliding bed gap, plain & compound rests, tool post, face plates, 10 HP/220/3/60 motor. Aaron Mach'y Co., 47 Crosby St., New York 12, N. Y.

Porter McLeod Engine Lathes, 16"x6', 16"x8', and 16"x10' beds. Made in Hatfield, Mass. Stock Delivery. Morey Machinery Co., Inc., Broome & Lafayette Sts., New York 13, New York.

1—30"x12' LeBlond Heavy Duty, geared head lathe—Timken bearing. Atlantic Machinery Exchange, 212A Centre St., New York, New York.

Logan — Clausing — Atlas. Immediate delivery from stock. Herman Machine and Tool Co., 714 3rd Ave., New York, New York.

36"x12' Lodge and Shipley, geared head engine lathe, swing 40", quick change. Fitzpatrick and Walsh, 2439 N. 9th St., Philadelphia 33, Pa.

"Remember PARISER Might Have It". Pariser Mach'y Corp., 3 Howard Street, New York, N.Y.

LATHES, TURRET

1" Cap. Rivett cabinet type, 1944. Spiro Machine Tool Co., 239 Centre St., New York, N. Y.

#1L Gisholt, Universal, 1943, indexing turret. Jayco Machine Co., 136 Liberty St., New York 6, N. Y.

(5) #2 W & S Cap. 1" (1941) (3) Bar Feed (2) Chuckers, cheap $1750. ea. Kings County Machinery Exchange, 408 Atlantic Ave., B'klyn 17, N. Y.

#3 Warner & Swasey, Universal, Serial No. 454365. Jaco Machine Co., 136 Liberty St., New York 6, N. Y.

3B Foster Univ., 5" hollow spindle mtr. dr., geared head. Clarence J. O'Brien, 1032 Commercial Trust Bldg., Philadelphia, Pa.

#3R & #4A Libby, bar feed, 1941. Jayco Machine Co., 136 Liberty Street, New York 6, New York.

#3R—6¼" Gisholt, M.D., Turret Lathe. Botwinik Bros., Inc., Welton Pkwy., New Haven, Conn.

#2G Morey, power feed, 2 turret, 1941. Bargain price. Jayco Machine Co., 136 Liberty St., N.Y.C.

Nos. 5, 4, 3, 2A, 2 & 1 Warner & Swasey. Aaron Machinery Co., 47 Crosby St., NYC 12.

#5—2½" Gisholt, M.D., Ram type, Univ. Botwinik Bros., Inc., Welton Pkwy, New Haven, Conn.

Nos. 5 (Bar Feed), 4R (9¼" Spindle hole), & 2L Gisholt. Aaron Machinery Co., 47 Crosby St., New York 12, New York.

Nos. 7, 5, & 2 Bardons & Oliver. All bar feed. Aaron Machinery Co., 47 Crosby St., NYC 12.

MILLING MACHINES

#2B Brown and Sharpe, double overarm, power rapid traverse, #50 taper spindle. Atlantic Machinery Exchange, 212A Centre St., N.Y.C.

Kearney & Trecker Model 2HL Plain Milling Machine. Morey Machinery Co., Inc. Broome & Lafayette Sts., New York 13, New York.

2—#3H Kearney & Trecker (1 with vertical attachment), Table: 6"x13½" with auto. feeds and power rapid traverse. Zeisel Machinery Co., 208 Centre Street, New York, New York.

#4 Cincinnati Plain, lima drive, table 64"x16", vert. hydr. Clarence J. O'Brien, 1032 Commercial Trust Bldg., Philadelphia, Pa.

Cincinnati 72"x54"x16', Hypro Planer Type 4 heads. Variable speeds. Botwinik Bros. of Mass., Inc., 7 Sherman St., Worcester, Mass.

1—Heavy Horiz. single pulley, Br. & Sh. #5B—Cheap. Kings County Machinery Exchange, 408 Atlantic Ave., B'klyn 17, N. Y.

#2G Univ. Kempsmith, All-State Mach'y Corp., 183 Centre St., N. Y. CAnal 6-4190.

Kent-Owens—No. 1-14 double spindle. Aaron Machinery Co., 47 Crosby St., New York, N. Y.

Production: 1-12 Cinc., Automatic, Late. Kings County Machinery Exchange, 408 Atlantic Ave., Brooklyn 17, New York.

Production: No. 08 Cincinnati, Pl. Horiz., MD, with rise and fall attach (several). Botwinik Bros., Inc., Welton Pkwy., New Haven, Conn.

Production: 24" Cincinnati, Delaware Equipment Co., 124 N. 3rd St., Phila., Penna. LO 3-4930.

Production: Sundstrand Rigidm l, hyd. feed, 14½" x 59" table, motor & coolant in base. Spiro Machine Tool Co., 239 Centre St., New York.

Thread: 6" x 80" Pratt and Whitney, Motor Driven. Thread Miller. Botwinik Bros., Inc., Welton Parkway, New Haven, Connecticut.

Vertical: Cleveland, new 1944, AC. Tri Machine & Tool Co., 248 Lafayette Street, New York 12, N. Y.

Vertical: No. 2 Maximiller, late, power feed all direction. Aaron Machinery Co., 47 Crosby St., New York 12, N. Y.

Vertical: Model 3VG Reed Prentice, Vert. Miller and Die Sinker, late, Complete. Aaron Machinery Co., 47 Crosby St., New York 12, New York.

1—Vertical, Single Pulley, Br. & Sh. #5—Cheap. Kings County Machinery Exchange, 408 Atlantic Ave., B'klyn 17, N. Y.

"Remember PARISER Might Have It". Pariser Mach'y. Corp., 3 Howard Street, New York, New York.

NIBBLERS

1—#250 Campbell, 36" throat, ¼" capacity. Federal Machinery Co., 134 Grand St., New York, N.Y.

1—3B Campbell, 30" throat, ½" capacity. Federal Machinery Co., 134 Grand St., New York, N.Y.

(Continued on the opposite page)

(Continued from opposite page)

PLANERS

30" x 30" x 12' Niles Bement Pond, 4 heads, D.C. Drive. Excellent Condition. Fitzpatrick and Walsh, 2439 N. 9th St., Phila. 33, Penna.

PRESSES

25 ton V&O, high speed, roll feed, Late. All-State Machinery Corp., 183 Centre St., N.Y.C.

50 top Lampco Hypermatic, 3" stroke, 18"x18¼" dia. space, Late type. Botwinik Bros. of Mass., Inc., 7 Sherman Street, Worcester, Massachusetts.

56 ton Niagara, double crank, 60" wide. Hyman Press Sales, 225½ Lafayette St., New York, N.Y.

75 ton #27 Bliss Consolidated Horning Press, 8" stroke, M.D., Late. Interstate Mach'y Co., Inc., "A" & Venange, Philadelphia, Pennsylvania.

150 ton Niagara, double crank, 84" wide. Hyman Press Sales, 225½ Lafayette St., New York, N.Y. 250 ton #77½ Lafayette St., N.Y.C.

Nos. 18, 19, 20 & 21 Bliss presses. Late type, in stock. Allied Machinery Exchange, 210 Centre St., N.Y.C. Phone: CAnal 6-1587.

Hydraulic: 2500 ton HPM Fastraverse, bed 6'x8' clear, inspection under power. (Late.) Kings County Machinery Exchange, 408 Atlantic Ave., Brooklyn 17, New York.

SHAPERS

16" Cincinnati Back geared crank, 8 speed factory motor drive. Fitzpatrick and Walsh, 2439 N. 9th St., Phila. 33, Penna.

16" Gemco, hydraulic, like new (used less than 8 months). FS-9007, Factory M & M.

32" Cincinnati Heavy Duty, Motorized. Fitzpatrick and Walsh, 2439 N. 9th St., Phila. 33, Penna.

SHEARS

36" ⅛ Capacity Pexto Over driven shear with motor and gauges. Federal Machinery Co., 134 Grand Street, New York City, New York.

8' x 16 gauge Pexto. 18" gap, Late. Delaware Equipment Co., 124 North 3rd Street, Philadelphia, Pa.

10' x 3/16" Niagara, with gauges. Aaron Machinery Co., 47 Crosby St., New York 12, N. Y.

10' x 10 ga. Cincinnati Shear. Samuel Machinery Co., 137 No. 3rd St., Philadelphia 6, Pa. MA 7-6100.

ELECTRICAL / POWER EQUIP.

AIR COMPRESSORS

270 C.F.M. Worthington 2 Stg., 600 lbs. Press, Belt Drive. Delta Equip. Co., 148 N. 3d St., Phila.

Sturtevant Centrifical Compressor—20 HP., 1750 CFM, 1 lb. pressure. Complete with compensator. J. J. Smith Electric Motor Co., 2315 N. 11th St., Philadelphia 33, Pa.

"Remember PARISER Might Have It". Pariser Mach'y. Corp., 3 Howard Street, New York, N.Y.

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4,000 CFM 3 lbs. pr. Ingersoll-Rand FS-538 Motorblower. Perry Equipment Corp., 1426 N. 6th St., Phila. 22, Pa.

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Plating, Anodizing, etc.—100 amperes up to 10,000 amperes, 6 to 60 volts—In Stock. L. J. Land, Inc., Est. 1910, 136 Grand St., New York 13, N.Y.

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Wheelco Capacilogs (3) New in original crates, less than ½ of Cost, Price $200 ea. Kings County Machinery Exchange, 408 Atlantic Ave., B'klyn 17, N. Y.

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200 HP Westinghouse, new XP class 1, group D, 3/60/2300/1200 RPM. Liberty Motor and Machinery Co., 807 W. Lake St., Chicago, Ill.

350 Burke (2), TEFC, 3/60/440/3600 RPM. Liberty Motor and Machinery Co., 807 W. Lake St., Chicago, Ill.

Slip Ring: 4-100 HP Gen. Elec. MT556, 3 phase, 60 cycle, 220 or 440 volt, 900 speed. Controls also. R. Scheinert & Son, 2214 Blair St., Philadelphia, Pa.

Variagle Voltage Motor Drives, 10PH to 250PH. L. J. Land, Inc., Est. 1910, 136 Grand St., N.Y.C.

PUMPS

Centrifugal, Bronze Motorpump: Ingersoll-Rand. 200 GPM—230', 20 HP, 3/60/220-440 TEFC. Perry Equipment Corp., 1426 N. 6th St., Phila. 22, Pa.

SPOTWELDER

50 KVA air operated rocker type arm type Alphil with timer. Federal Machinery Co., 134 Grand St., New York City, N.Y.

TRANSFORMERS

3—167 KVA Gen. Elec., Type HS, IP, 60 C, 2400/5160Y pri. volts, 120/240 sec. volts, with 4 2½% taps. New 1950. R. Scheinert & Son, 2214 Blair St., Philadelphia, Pa.

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(Additional Position Vacant Advertising on the following page)

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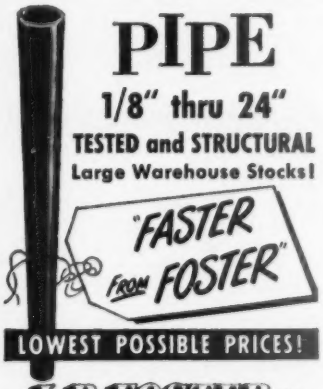

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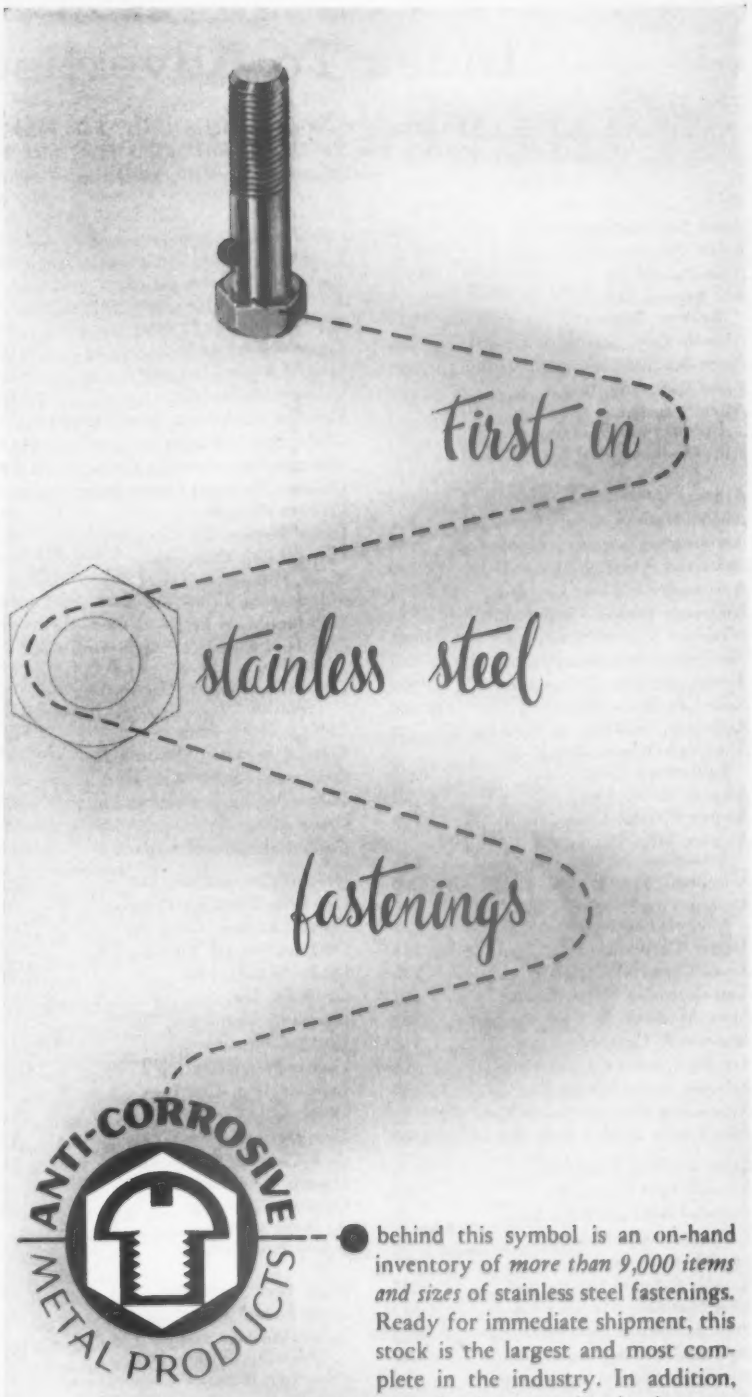

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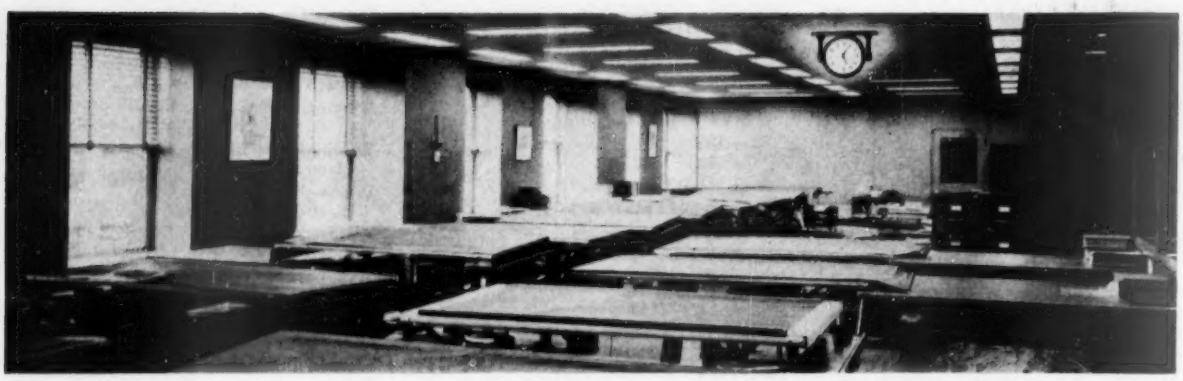

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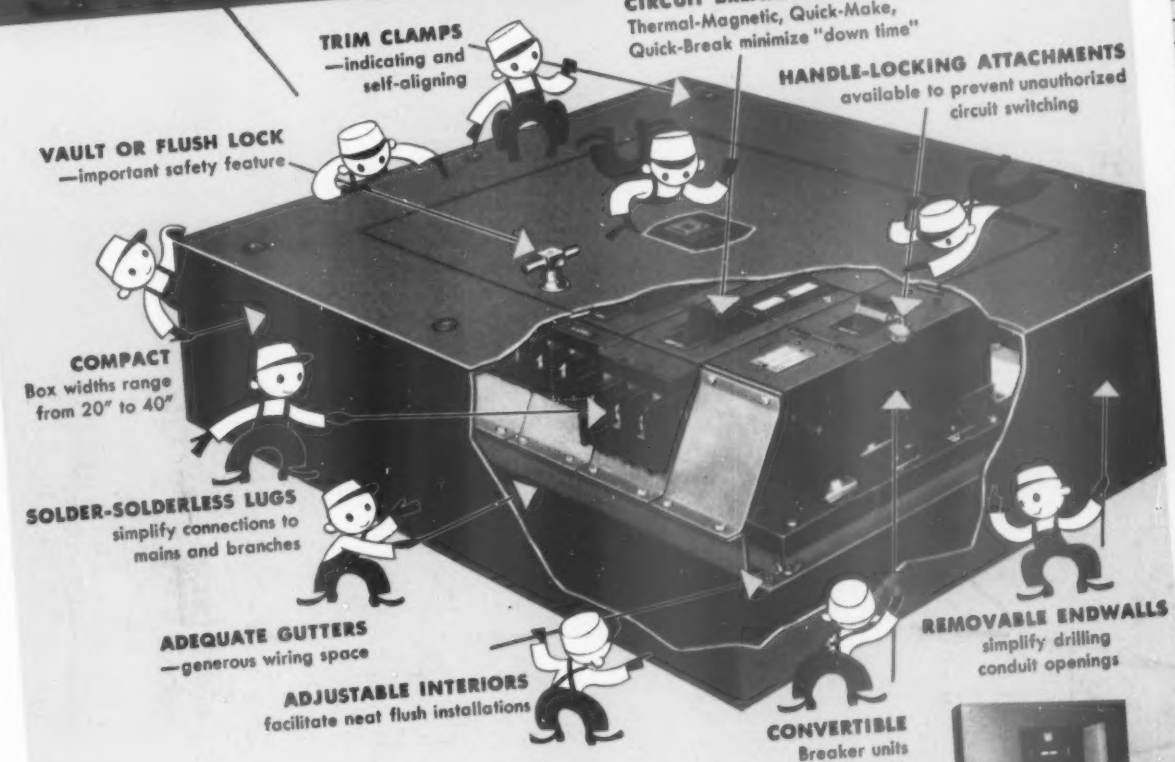

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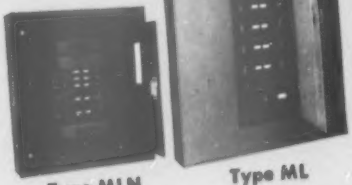

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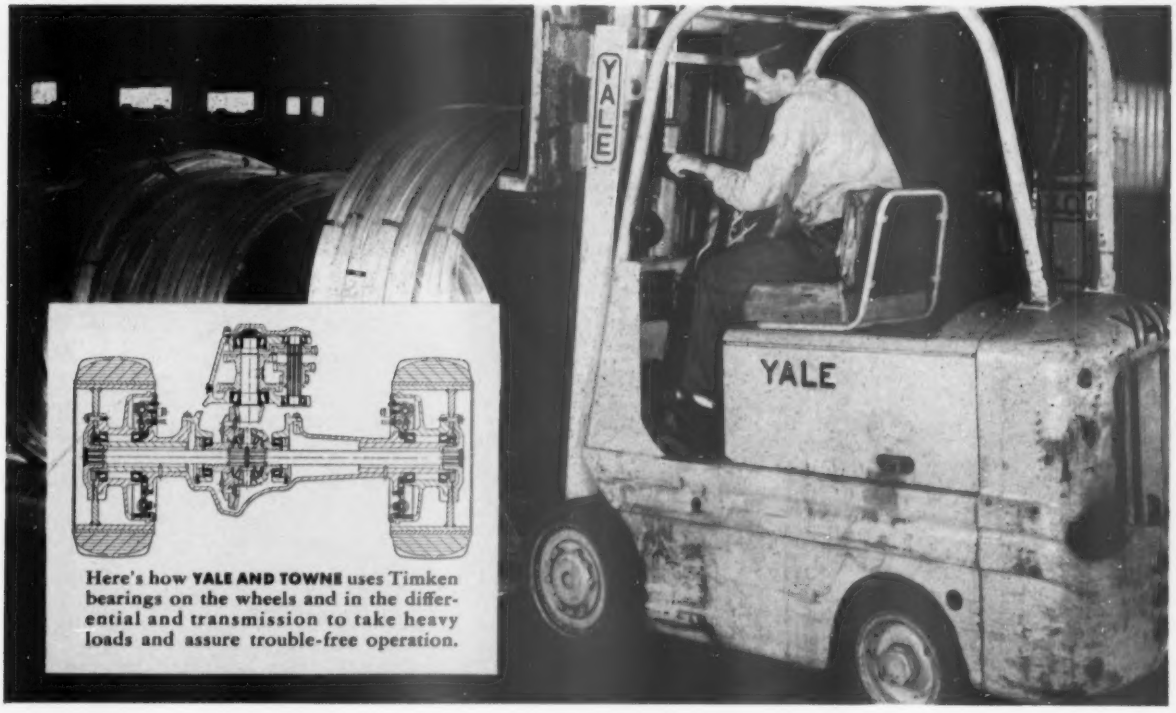
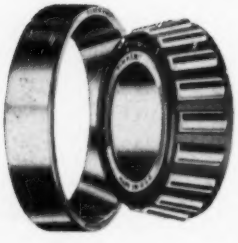
No other bearing can give you all the advantages you get with Timken bearings. Specify them in every machine you buy or build. Look for the trade-mark "Timken" on the bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ont. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



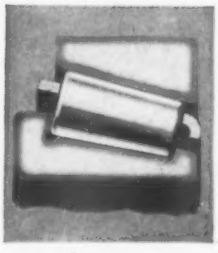
Here's how YALE AND TOWNE uses Timken bearings on the wheels and in the differential and transmission to take heavy loads and assure trouble-free operation.



TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS



GREATER LOAD AREA

Because the load is carried on the *line* of contact between rollers and races, Timken bearings carry greater loads, hold shafts in line, wear longer.

The Timken Roller Bearing Company is the acknowledged leader in: 1. advanced design; 2. precision manufacturing; 3. rigid quality control; 4. special analysis steels.

NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ⬮ AND THRUST →⬮← LOADS OR ANY COMBINATION →✳←